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FIREPOWER

(ENGLISH)

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FOREWORD

1. B-GL-300-007/FP-001, *Firepower*, is issued on the authority of the Chief of the Defence Staff.

2. Suggestions for amendments should be forwarded through normal channels to the Director of Army Doctrine, attention DAD-7.

3. Unless otherwise noted, masculine pronouns apply to both men and women.

4. The NDID for the French version of this publication is B-GL-300-007/FP-002.

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PREFACE

GENERAL

1. This doctrinal manual describes in detail the multi-dimensional concept of Firepower that the army has embraced as a combat function. This manual expands upon the operational and tactical notions of Firepower as presented in B-GL-300-001/FP-000, *Conduct of Land Operations—Operational Level Doctrine for the Canadian Army* and B-GL-300-002/FP-000, *Land Force Tactical Doctrine*.

PURPOSE

2. The purpose of B-GL-300-007/FP-001, *Firepower*, is to explain the role of this combat function in the generation of combat power and how it contributes to success on the battlefield. The manual establishes the doctrinal basis for Firepower and defines its capability components and functions.

SCOPE

3. This publication is based on the precept that success in battle is fundamentally related to the successful integration of Firepower with the other combat functions of Command, Protection, Manoeuvre, Information Operations and Sustainment. The manual stresses the role of firepower, within the context of the manoeuvrist approach, in the conduct of deep, close and rear operations.

4. Chapter 1 explains Firepower from the perspective of Canada's Army and makes a distinction between the firepower that is organic to a manoeuvre force commander, and that which falls within the purview of fire support, including indirect fire and firepower resources external to the manoeuvre force.

5. Chapter 2 deals with fire support and covers the vital role of the field artillery in contributing to firepower and in binding the constituent components of fire support together so that the effects of each are

effectively meshed with the force commander's intent and concept of operations.

6. The role of the targeting process in enabling the commander to synchronize information operations, manoeuvre and firepower systems by attacking the right target with the best system and munitions at the right time is explained in Chapter 3.

7. Air defence, doctrinally a component of the Protection combat function, possesses characteristics that make it also an element of Firepower and, as such, the subject is considered in Chapter 4.

8. Finally, Chapter 5 deals with non-lethal weapons and explains how these weapons and agents have added another dimension to the conduct of operations.

OFFICE OF PRIMARY INTEREST

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TERMINOLOGY

10. The terminology used in this publication is consistent with that of the Army Vocabulary and AAP-6 (U) *NATO Glossary of Terms and Definitions*.

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CHAPTER 1
THE APPLICATION OF FIREPOWER

It is firepower, and firepower that arrives at the right time and place, that counts in modern war—not manpower.

Captain Sir Basil Liddell Hart, Thoughts on War, 1944

INTRODUCTION

1. Firepower, integrated with manoeuvre or independent of it, is used to destroy, neutralize, suppress and harass the enemy. Firepower effects occur at the strategic, operational and tactical levels and must be synchronized with other attack systems. Maximum firepower effects require the full integration of army and joint service systems and procedures to determine engagement priorities, locate, identify, and track targets, allocate firepower assets and assess battle damage. Firepower should be viewed as a joint concept as it includes conventional land, air and maritime weapons effects. It encompasses the collective and coordinated use of target acquisition data from all sources, direct and indirect fire weapons, armed aircraft of all types, and other lethal and non lethal means against air, ground and sea targets.

2. Firepower is divided into two categories: those weapons that are organic to a manoeuvre unit, which are usually direct fire in nature and those primarily found within the scope of fire support and air defence. Fire support includes field artillery, mortars and other non-line of sight fires, naval gunfire, tactical air support, and elements of offensive information operations (IO).

3. Firepower is used for both fixing and striking. Implicit in both the dynamic forces of fixing and striking is finding, an activity for which firepower organizations are well suited (e.g. artillery target acquisition). The utility of firepower demands coordination with other battlefield activities to achieve the greatest combined effect upon the enemy. The sudden lethal effects of firepower can cause localized disruption and dislocation, which may be exploited by manoeuvre. Firepower is also coordinated with information operations to ensure that electronic and psychological attack reinforces the physical and moral effects of firepower and manoeuvre. Using a combination of weapon systems to complicate the

opponent's response is always desirable. The use of firepower, and the threat of its use, can have a tremendous effect upon enemy morale. The effects of firepower are often temporary and should be exploited immediately.

4. Firepower is a key element in defeating the enemy's ability and will to fight. The traditional division between direct and indirect fire is becoming less meaningful. Indirect fire is increasingly able to achieve lethal precision effects; direct fire in the strict sense can be complemented by weapon systems in which the operator directly observes the target but his platform may not be in view. The application of firepower should be judged solely by the effect required on the enemy in terms of destruction, neutralization or suppression and in shaping the enemy. This prompts consideration of the volume, duration, and lethality of fire and the precision and range of munitions. The appropriate mix of weapons systems can then be chosen to achieve the desired effect.

FIREPOWER EFFECTS

5. Firepower effects are described as follows:

a. **Destruction**. Destruction physically renders the target permanently combat-ineffective or so damaged that it cannot function unless it is restored, reconstituted or rebuilt.

b. **Neutralization**. Neutralization fire renders the target ineffective or unusable for a temporary period. Neutralization fire results in enemy personnel or materiel becoming incapable of interfering with an operation or course of action.

c. **Suppression**. Suppressive fire degrades a target (e.g. weapon system) to reduce its performance below the level needed to fulfil its mission objectives. Suppression lasts only as long as the fire is delivered onto the target.

d. **Harassment**. Harassing fire is designed to disrupt the activities of enemy troops, to curtail movement and, by threat of losses, to lower morale.

OPERATIONAL FIREPOWER

6. At the operational level of conflict, a commander prescribes what military actions are necessary to achieve the nation's strategic aim. At this level, commanders design, prepare and conduct joint campaigns and major operations, each of which comprise a series of battles, engagements and other actions. In developing a campaign plan, the operational commander and his staff require a clear picture of the theatre organization and command relationships. The theatre of operations is subdivided into a number of areas of operations. Each subordinate level of command will further define their area of operations by determining their area of interest and area of influence. Decentralization is further enhanced by defining, within a particular area of operations, responsibility for deep, close and rear operations.[1]

7. At the operational level, lethal and non-lethal firepower is employed in deep, close and rear operations to achieve a decisive impact on the conduct of a campaign or major operation. Firepower and manoeuvre are not interchangeable at the operational level; each has a distinctive quality, complementary to the other. Operational firepower is normally furnished by assets other than those required for the routine support of tactical manoeuvre however, some assets, such as air and tactical missile systems, can support both.

8. Operational firepower focuses mostly on one or more of three general tasks: facilitating operational manoeuvre, isolating the battlefield, and attacking critical functions and facilities. Manoeuvre is supported by fixing, turning, disrupting or blocking the enemy, complicating enemy command and control, disrupting the sustainment of his forces and degrading his weapon systems. Isolating the battlefield could involve

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[1] B-GL-300-001/FP-000 *Operational Level Doctrine for the Canadian Army*, Chapters 1 and 5, provides a detailed explanation of the Levels of Conflict and Theatre Organization. An Area of Interest is the area in which a commander wishes to identify and monitor those factors, including enemy activities, which may influence the outcome of current and anticipated missions. An Area of Influence is that area within which a commander can directly influence operations by manoeuvre, information operations or fire support systems under his command or control.

disruption of lines of communications, destruction of intelligence collection means and communications networks and prevention of the move forward of reserve and follow-on forces. Operational firepower may also be used independent of manoeuvre to damage key enemy forces or facilities.

FIREPOWER AT THE TACTICAL LEVEL

9. At the tactical level of conflict, battles, engagements and other actions are planned and executed to accomplish military objectives established by the operational level commander. Tactical firepower consists of the coordinated and collective use of target acquisition data, direct and indirect fire weapons, armed aircraft and other means against enemy elements in contact or imminent contact. Tactical firepower includes line of site weapons, artillery, mortars, close air support, aviation, naval gunfire and offensive IO. Manoeuvre commanders normally direct tactical firepower in support of manoeuvre operations.

10. At the tactical level, the commander needs highly responsive firepower in order to accomplish his mission. He fights the current close operation while fighting the deep battle to shape future close operations. The commander may also have to employ his firepower assets in the conduct of rear operations, at times simultaneously with close and deep operations. In the pursuit of tactical objectives, firepower is employed in the following manner:

a. to shape the enemy;

b. to attack enemy capabilities that have or can have an immediate impact on tactical operations;

c. to seize and retain the initiative and maintain the tempo of friendly operations;

d. to fight committed enemy formations throughout the depth of their dispositions; and

e. to defeat the enemy in decisive close combat.

CAPABILITY COMPONENTS

11. The Firepower function comprises the following capability components:

a. Direct and Indirect Fire in Conjunction with Manoeuvre.

(1) Direct fire involves the use of line of sight weapon systems to either fix or strike. Its utility demands coordination with other battlefield activities, particularly manoeuvre, to achieve the greatest combined effect upon the enemy. Direct fire can be used to destroy, neutralize, suppress and demoralize. It is essential in defeating the enemy's ability and will to fight.

(2) Indirect fire is provided primarily by field artillery and mortars. It shatters the enemy's cohesion and undermines his will to fight. With its intrinsic flexibility, field artillery can be brought to bear on deep, close and rear operations, simultaneously if necessary. It must be synchronized with other battlefield activities in terms of time, space and purpose to achieve the optimum concentration of force. Target priorities must be established and artillery must be used aggressively in concert with other firepower assets and intelligence, surveillance, target acquisition and reconnaissance (ISTAR) resources.

b. **Firepower Alone**. Firepower may be used in isolation from manoeuvre to destroy, neutralize, suppress or harass - and hence to delay or disrupt enemy critical capabilities and uncommitted forces. Firepower can be tasked to destroy but its effectiveness may be difficult to confirm. For firepower to be effective, the attack resources must be linked to the appropriate sensors to provide both target acquisition and damage assessment. At formation level, the linking of ISTAR assets to fire support coordination elements is now a widespread practice.

c. **Coordination of the Targeting Process**. Targeting is defined as "the process of selecting targets and matching the appropriate response to them, taking account of operational requirements and capabilities" (AAP-6). It is the mechanism for coordinating ISTAR and attack resources, such as aviation, indirect fire and offensive IO to ensure that they are properly integrated and that the most appropriate weapon system attacks each target. It is, therefore, a tool for the efficient and effective management of resources and its successful implementation is fundamental in our speed of reaction to the enemy.

d. **Air Defence (AD).** Land based air defence makes a vital contribution to the survival and manoeuvrability of a force by protecting it from aerial attack and surveillance. AD artillery contributes to firepower through the aggressive use of its weapon systems to destroy or disable enemy air vehicles. This component also includes all arms AD (AAAD), the active AD measures taken by combat units, primarily by means of integral, non-AD specialized weapons. AD therefore has characteristics than span both the Protection and Firepower combat functions.

e. **Non-lethal Weapons**. Disabling or non-lethal measures may be employed across the continuum of military operations, including combat operations, against personnel and materiel targets, with the following aims:

(1) to impair or control human capabilities;

(2) to prevent mobility of equipment and personnel;

(3) to neutralize weapons and crews;

(4) to exploit or disrupt command and control;

(5) to degrade infrastructure.

INTERACTION WITH THE OTHER COMBAT FUNCTIONS

12. Firepower contributes to all combat functions and it is a fundamental component of combat power. The relationship of firepower to the other combat functions is as follows:

a. **Manoeuvre.**

(1) Manoeuvre and firepower are inseparable and complementary dynamics of combat power. Manoeuvre is the employment of forces through movement in combination with speed, firepower or fire potential, to attain a position of advantage in respect to the enemy. Firepower provides the weapons effects essential for the defeat of the enemy's ability and will to fight and is most effective when combined with manoeuvre.

(2) Successful manoeuvre requires not only fire and movement, but also agility and versatility of thought, plans, operations and organizations. Operational manoeuvre is the disposition of forces to create a decisive impact on the conduct of the campaign by either securing the operational advantages of position before battle is joined or exploiting tactical success to achieve operational results. Tactical manoeuvre occurs once units deploy into battle formations within the operational area. Manoeuvre continually poses new problems for the enemy, rendering his reactions ineffective, and eventually leading to his defeat. Firepower is a key aspect of both operational and tactical manoeuvre and as such, firepower assets must be positioned on the battlefield so they can influence the enemy's

centre of gravity[2] on either the physical or moral plane as required.

(3) Firepower and manoeuvre forces are concentrated at decisive points to destroy enemy elements when the opportunity presents itself and when such a confrontation fits the larger purpose. These actions may involve high attrition of selected enemy forces where firepower is focused against critical enemy assets. The aim of this attrition is not merely to reduce incrementally the enemy's physical strength but to contribute to the enemy's systematic disruption. The greatest effect of firepower is generally not physical destruction—the cumulative effects of which are felt only slowly—but the disruption it causes.

(4) The effectiveness of firepower and manoeuvre are also enhanced by the integration of obstacles. Planning barriers in conjunction with firepower and manoeuvre forces the enemy to conform to the commander's intent. If the enemy can move it is done to our benefit and his detriment. With movement impeded the enemy is disrupted, turned, fixed or blocked.

(5) Firepower may also play a key role in deception operations. In this application, firepower can be used to support a feint or demonstration by manoeuvre forces by helping to convince the enemy that the action is of sufficient strength so as to pose a major threat.

b. **Protection.**

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[2] B-GL-300-001/FP-000 describes Centre of Gravity as that characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength, or will to fight.

(1) Protection preserves the fighting power of a force so that it can be applied at a decisive time and place. Firepower contributes to protection by fixing the enemy through neutralizing fire while our own forces are manoeuvring or by destroying the enemy before he is in position to attack effectively. Firepower can also protect the force from ground attack by using counter-mobility munitions such as anti-tank scatterable mines. Firepower systems also require protection particularly in an expanded battle space. Within our own lines, area protection is not sufficient in many cases especially when the bypass policy is too liberal. Firepower assets should be concealed from the enemy, especially from his direct fire weapons, by means of deployment tactics, camouflage and concealment, emission control (EMCON) measures and an unmasking policy.

(2) Air defence is another key aspect of protecting freedom of action and it encompasses land, air and maritime capabilities. It prevents the enemy from using a primary means, air power, to break friendly cohesion. While air defence is a component of the Protection combat function, its capabilities extend within the realm of Firepower and, as such, it will be considered in Chapter 4 of this publication.

(3) An essential component of protection is the avoidance of fratricide, the killing or wounding of friendly personnel by fire. The destructive power and range of modern weapon systems coupled with the high intensity and rapid tempo of the modern battlefield increases the potential for fratricide. Commanders must be aware of those tactical manoeuvres and terrain and weather conditions that foster fratricide and take appropriate measures to reduce these effects. These measures include the exercise of effective

command, the use of identification means, detailed situational awareness and adherence to disciplined operating procedures and anticipation of operations when conditions raise the probabilities of fratricide. With this knowledge, commanders can exercise positive control over firepower resources without overly constricting initiative and audacity in combat.

c. **Information Operations (IO)**. IO provides the requisite Communication Information Systems (CIS) and relevant information, including ISTAR, which enables firepower assets to accurately acquire and identify targets and to conduct battle damage assessment. Information systems provide for the establishment of essential communication linkages to facilitate rapid target engagement. Offensive IO may be used as a means of attacking targets with the aim of denying the enemy the effective use of his C2 by influencing, degrading or destroying his C2 Information Systems. Defensive IO has the aim of maintaining the effectiveness of friendly C2, including those of the Firepower combat function, as well as protecting friendly forces from the effects of enemy offensive IO.

d. **Command**. Command is the authority vested in an individual for the direction, coordination and control of military forces. Military command encompasses the art of decision-making, motivating and directing resources into action to accomplish a mission. It requires a vision of the desired result, an understanding of concepts, missions, priorities and the allocation of resources.[3] With regard to firepower, commanders must ensure that:

(1) firepower and target acquisition assets are deployed within effective range of critical target areas;

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[3] B-GL-300-003/FP-000, *Command*, pp. 3-4.

(2) firepower resources are apportioned to subordinate commanders to support lower level operations;

(3) ammunition, in sufficient quantity and nature for planned operations, is provided to the various weapons systems;

(4) sufficient intelligence is provided concerning enemy capabilities and intentions; and

(5) an effective command and control system is established so that fire can be applied to support deep, close and rear operations.

e. **Sustainment**. Sustainment of the force is a key component of combat power and must be part of the planning and execution of operations. Firepower assets, including artillery, consume large quantities of combat supplies resulting in one of the largest challenges to the replenishment system. Close cooperation between firepower and sustainment staffs is necessary to ensure that the correct quantities of combat supplies, particularly ammunition and fuel, arrive at the designated location at the right time to allow the commander to influence the battle. Other sustainment functions including medical evacuation, repair and recovery, routine replenishment and personnel replacements must also be considered as the dispersion of firepower assets adds a significant dimension to providing this support.

COMBAT POWER

13. Combat Power is the total means of destructive and/or disruptive force, which a military unit/formation can apply against an opponent at a given time (AAP-6). Overwhelming combat power is achieved when all combat elements are efficiently and effectively brought together, at the decisive point and time, giving the enemy no opportunity to respond with coordinated or effective opposition. As explained in B-GL-300-002/FP-000, *Land Force Tactical Doctrine*, armies use combat power to fix and to strike

the enemy. Inherent in the two dynamic forces of fixing and striking is the requirement to find the enemy.

14. Firepower plays a key role in the creation of combat power by contributing to the two dynamic forces of Fixing and Striking in the following manner :

a. **Fixing the Enemy.**

(1) Fixing involves the use of combat forces to hold ground against enemy attack, to hold or fix an enemy in one location by firepower and/or manoeuvre, or to hold vital points by protecting against enemy intervention. The object of fixing is to deprive the enemy of his freedom of action and therefore his ability to manoeuvre. It achieves freedom of action for friendly forces to strike the enemy in a manner, place and time of their choosing.

(2) Firepower contributes to fixing the enemy by the following:

(a) the application of firepower to destroy, neutralize, suppress or harass elements of the enemy force and deny the enemy freedom of action;

(b) the protection of friendly forces, particularly by counter battery fire, to enable tasks and missions to be achieved; and

(c) the creation of surprise by the use of deception and fire plans to distract the enemy from his main purpose and deny him his goals.

b. **Striking the Enemy.**

(1) Striking the enemy is achieved by attacking on the physical or moral planes, or ideally a combination of both. The objective of striking in physical terms is to manoeuvre into a position from which to focus combat power to capture ground, to destroy equipment, vital points and installations, to kill enemy personnel or to gain a position of advantage. Firepower contributes to striking the enemy by means of the following:

(a) the deployment of fire support assets to achieve the maximum concentration of combat power;

(d) the coordination of fire plans;

(e) the use of the targeting process to prioritize, synchronize and deliver fire in concert with the overall operational plan; and

(f) the deployment of air defence artillery to interdict enemy flight corridors and enable our own forces to strike the enemy by providing protection.

(2) Striking the enemy on the moral plane aims to destroy his cohesion by attacking his morale, his sense of purpose or his decision-making ability. By its very nature, firepower intrinsically contributes to this goal through casualties, materiel destruction and psychological trauma caused by munitions effects or information attack. Firepower often plays a key role in feint attacks, demonstrations of force and disruption of enemy command and control infrastructure by fire.

15. Finding the enemy is essential to our ability to fix and strike him successfully. Firepower surveillance and target acquisition assets gain information and intelligence to identify enemy locations, capabilities and

intentions. This information is acquired through the employment of target acquisition systems and the coordination of these assets with other ISTAR systems. The assets allocated to this role include unmanned aerial vehicles (UAVs), weapon locating and surveillance radars, electronic warfare (EW), air and aviation as well as the necessary linkages to strategic and operational ISTAR assets. The process is also aided by the participation of fire support staff in the Intelligence Preparation of the Battlefield (IPB) and targeting processes.

16. The use of the targeting process to prioritise, synchronize and deliver firepower effects in unison with the overall operational plan, and the effective and efficient use of command and control are central to the achievement of the above objectives. Targeting is discussed in detail in Chapter 3 of this publication.

FIREPOWER AND THE MANOEUVRIST APPROACH

17. Canada's Army has adopted the manoeuvrist approach to operations. The manoeuvrist approach is defined as a philosophy that seeks to defeat the enemy by shattering his moral, and physical cohesion, his ability to fight as an effective coordinated whole, rather than destroying him by incremental attrition. [4] The manoeuvrist approach concerns itself primarily with attacking the enemy's critical vulnerability, which does not necessarily imply physical destruction. Conversely, this concept does not rule out attrition, which may not only be unavoidable at times, but necessary depending upon the commander's concept of operations.

18. The manoeuvrist approach is not to be confused with the combat function Manoeuvre. In this context, manoeuvre is the employment of forces through movement in combination with speed, firepower or fire potential, to achieve the mission.[5] Manoeuvre refers to the employment of forces through offensive or defensive operations to achieve positional advantage over an enemy force. Generating combat power on a battlefield requires combining the movement of combat forces and employment of

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[4] B-GL-300-002/FP-000, *Land Force Tactical Doctrine*, p. 1-7.

[5] B-GL-300-002/FP-000, p. 1-8.

their direct fire resources in unison with fire support. The more immediate the combat in time and space, the more intertwined are firepower and manoeuvre.

19. The effective coordination of firepower and manoeuvre requires direction from the commander on where fire will be applied and flexible command and control arrangements. This allows firepower effects to be allocated while not tying the delivery systems to a particular aspect of the manoeuvre force. Firepower in deep operations is invariably a joint activity. In close operations, joint forces may provide the means but command must lie with the close operation commander.

COMBINED ARMS

20. In order to maximize combat power, all available resources must be employed to the best advantage. Combined arms methodology is the full integration of arms in such a way that, to counteract one, the enemy becomes more vulnerable to another. This objective is accomplished through tactics at lower levels and through task organizations at higher levels. In doing so, the complementary characteristics of different types of units are used to best advantage and mobility and firepower are enhanced.

21. Generating effective firepower against an enemy requires that organic and supporting fire assets be coordinated with other combat functions such as command, information operations and sustainment. Subordinate systems and processes for determining priorities, identifying and locating targets, allocating fires assets, attacking targets, and assessing battle damage must be fully integrated. The efficient use of firepower will ensure that the right targets are adequately attacked to achieve the commander's intended effects.

22. Commanders are responsible for fighting their firepower and manoeuvre assets. Manoeuvre commanders fight much of their firepower through the fire support component as a significant portion of their firepower resources come from external sources. Consequently, the ability to employ firepower assets throughout the depth of the battlefield, as an integrated and synchronized whole, is done through the process of fire support planning, coordination, and execution. Fire support coordination is the element that binds fire support resources together so that the multiple effects of each asset are synchronized with the force commander's intent

and concept of operations. This aspect of firepower is covered at length in Chapter 2—Fire Support.

MANOEUVRE AND ORGANIC FIREPOWER

23. Organic firepower includes the firepower assets integral to a manoeuvre unit. These resources include small arms, machine guns, vehicle mounted cannons, grenade launchers, anti-armour weapons, mortars and tank guns, and are commanded and controlled by the manoeuvre unit commander.

24. Manoeuvre forces employ fire and movement to close with and destroy an enemy, to seize and hold terrain and to gain information. They consist of mounted and dismounted units. Dismounted manoeuvre forces include light, airborne and air assault units. They have a high degree of strategically deployability and, depending on the nature of the mission and terrain, either complement mounted manoeuvre units, or are complemented by them. While dismounted forces have a distinct mobility advantage over mounted troops in restricted or urban terrain, they have a limited amount of organic firepower compared with mounted forces.

25. Mounted manoeuvre forces employ a combination of armoured and mechanized infantry units. Mounted units employ tanks, armoured fighting vehicles and dismounted infantry within a combined arms team that produces mobile, protected firepower to create an overwhelming shock effect. The effectiveness of armoured and infantry combined arms groupings rests on their ability to rapidly combine complementary effects, particularly in the area of firepower, to present the enemy with a variety of threats more rapidly than he can react. In addition to providing increased mobility and protection, the light armoured vehicle (LAV) significantly enhances the firepower of an infantry force.

FIREPOWER AND THE LAW OF ARMED CONFLICT

26. Members of the Canadian Forces (CF) participating in an armed conflict are obliged to comply and ensure compliance with all International Treaties and Customary International Law binding on Canada. These provisions are contained in the Code of Conduct for CF Personnel and are amplified in B-GG-005-027/AF-020, *Legal Support,* Volume 2, *Law of*

Armed Conflict, which details the application of the law of armed conflict (LOAC) at the operational and tactical levels. The LOAC explains the principles and definitions that guide military forces in the selection of legitimate weapons and targets. Further guidance with respect to the LOAC is provided in Chapter 3 (The Targeting Process) of this manual.

SUMMARY

27. Firepower, either integrated with manoeuvre or employed independently, can be used to destroy, neutralize, suppress and harass the enemy. As one of the principle means of generating combat power, it can be used for both fixing and striking the enemy and can attack the enemy on the moral as well as the physical plane. Ownership of the various firepower assets is irrelevant, and the focus should be on coordinating available weapons platforms to produce the maximum effect on the enemy as directed by the commander.

28. Firepower is closely related to the other combat functions. Organic firepower is integral to manoeuvre units while non-organic firepower, in the form of fire support, is provided from resources beyond the manoeuvre unit commander's control. Firepower contributes to the protection of the force by fixing the enemy through neutralizing fire while friendly forces are manoeuvring or by destroying the enemy before he is in a position to attack effectively. IO provides firepower systems with the necessary communications architecture, the means to acquire targets and, through offensive IO, a means of target engagement. Firepower resources can not be employed to optimum capability without an efficient command structure capable of translating the commander's intention and concept of operations into action. This involves procedures that are relevant, responsive and compatible with modern C2 technology. Finally, without careful sustainment planning and coordination, particularly for the re-supply of ammunition, firepower can not function.

CHAPTER 2
FIRE SUPPORT

Battles are won by superiority of fire.

Frederick the Great, Military Testament, 1768

INTRODUCTION

1. Fire support is the collective and coordinated use of the fire of land and sea based indirect fire systems, armed aircraft, offensive information operations (IO) and non-lethal munitions against ground targets to support land combat operations at both the operational and tactical levels. Fire support is the integration and synchronization of fire and effects to delay, disrupt, or destroy enemy forces, combat functions, and facilities in pursuit of operational and tactical objectives. It includes field artillery, mortars, naval fire and air-delivered weapons. The force commander employs these means to both support his manoeuvre plan and to engage enemy forces in depth. Fire support planning and coordination are essential at all echelons of command.

2. Generating effective firepower against an enemy requires that organic and supporting firepower be integrated with the other combat functions. Subordinate systems and processes for determining priorities for fire, identifying and locating targets, allocating assets, attacking targets, and assessing battle damage must be fully integrated. Fire support provides for the planning and execution of fire so the right targets are effectively attacked to achieve the commander's intended effects.

3. Commanders are responsible for fighting their fire and manoeuvre assets. A significant portion of the firepower available to a commander comes from sources external to his command. Consequently, the ability to employ all available firepower throughout the depth of the battlefield, as an integrated and synchronized whole, is done through the process of fire support planning, coordination, and execution. The artillery commander coordinates fire support by binding fire support resources together so that the multiple effects of each asset are synchronized with the force commander's intent and concept of operations. Manoeuvre commanders must understand the capabilities and limitations of all fire support means and must integrate fire support into their operational plans. Conversely, the

artillery commander must be clear on the supported commander's concept of operations. The effective planning, coordination and synchronization of fire support is critical to success in war as well as operations other than war (OOTW).

FIRE SUPPORT IN DEEP, CLOSE AND REAR OPERATIONS

4. Land operations encompass three inseparable aspects - deep, close, and rear operations, which must be considered together and fought as a whole. The concept of deep, close and rear operations provides a means of visualizing the relationship of friendly forces to one another, and to the enemy, in terms of time, space, resources and purpose. They are focused on attacking the enemy's cohesion and will be conducted on both the moral and physical planes[1]. Deep, close and rear operations may overlap in time and space and some formations and units may engage in each at different stages.

5. Deep and close operations should be conducted concurrently not only because each influences the other, but also because the enemy is best defeated by fighting him throughout his depth. The requirement to integrate and synchronize fire support with these three operations is inherent in this responsibility. The role of fire support in deep, close and rear operations is as follows:

a. **Deep Operations.**

(1) Deep operations can degrade the enemy's firepower, disrupt his command and control, destroy his logistic base and break his morale. While fire support plays an essential role in the conduct of deep operations, the integrated application of firepower and manoeuvre make a

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[1] B-GL-300-001/FP-000 describes conflict on the moral plane as a struggle between opposing wills. The term *moral* pertains to those forces that are psychological rather than physical in nature, including the mental aspects of conflict. On this plane, the quality of military leadership, the morale of the fighting troops, their cohesion and sense of purpose are of primary importance.

deep attack capability effective. Success is founded on the synchronization of all assets at all echelons.

(2) Deep operations are generally offensive actions conducted at long range and over a protracted time scale against enemy forces and functions beyond close operations. Deep operations can shape the enemy and prevent him from using his forces where and when he wants to on the battlefield. Fire support assets, particularly artillery and armed aircraft, and target acquisition means, are major contributors to these operations. The success of deep operations is also reliant upon air defence to protect the attack resources and, as applicable, the manoeuvre elements.

(3) The commander's battle plan for deep operations requires several special considerations. Deep operations may include the use of surface-to-surface artillery, aviation, air, offensive IO, non-lethal weapons (NLW) or manoeuvre or a combination of any of the above. Manoeuvre forces may be required to exploit the result of large-scale, conventional deep fire support or to set the conditions for deep attacks. Fire support is the most responsive asset that the operational-level commander has to shape the enemy's operations. The successful conduct of deep operations requires careful analysis of enemy capabilities to interfere with friendly operations and of enemy vulnerabilities. Only those enemy targets that pose a significant threat to friendly forces or those that are essential to the accomplishment of a critical enemy capability, are potential targets for engagement. Examples of such targets include: command and control facilities, fire support, air defence and ISTAR assets, reserves, weapons of mass destruction (WMD) and logistic installations.

(4) At division level and above, deep operations are planned and controlled in the deep operations coordination centre (DOCC) located in the main division command post (CP). The DOCC is formed by selected staff members from the appropriate main CP cells under the overall direction of the division chief of staff. The DOCC provides the commander with a means to focus the activities of all units, agencies and cells involved in supporting deep operations. Artillery representation is a key element in the DOCC composition, particularly with respect to targeting, which will be addressed in the following chapter.

(5) Typical deep fire support tasks include the following:

(a) destroying, neutralizing or suppressing selected targets in the depth of the formation's area of influence;

(b) delivering scatterable anti-tank mines, electronic jammers and non-lethal munitions deep into the formation's area of influence; and

(c) suppressing enemy air defences.

b. **Close Operations.**

(1) Close operations are conducted by forces in contact with the enemy and are usually fought by manoeuvre brigades and units. Close operations are primarily concerned with striking the enemy, although the purpose also includes fixing selected enemy forces in order to allow a strike by another component of the force. These operations are conducted at short range and in an immediate time scale. Artillery guns, with their relatively good accuracy and consistency,

variable rates of fire, variety of munitions and inherent flexibility, are well suited to such operations. Artillery is usually commanded at the highest level while control of fire may be decentralized to the lowest levels (e.g. forward observation officer (FOO) at combat team level).

(2) Close operations include the battles and engagements of a force's manoeuvre and fire support units, together with the requisite combat support and combat service support functions, to seek a decision with the enemy. Close fire support is directed against targets or objectives that are sufficiently near the supported force as to require detailed integration or coordination of the supporting action with fire, movement, or other actions of the supported force.

(3) Close fire support is employed both to protect the force and to provide maximum combat power at the decisive point of an engagement. The direct support (DS) standard tactical mission requires a field artillery unit to provide close supporting fire to a specific manoeuvre brigade.

(4) Fire support for close operations includes the following activities:

(a) fire support advice, planning and coordination by artillery staffs and tactical groups at the following levels:

i. Division—Commander Division Artillery (CDA) and staff;

ii. Brigade—Field artillery regiment CO and Fire Support Coordination Centre (FSCC);

iii. Battle Group—affiliated Battery Commander (BC) and FSCC; and

iv. Combat Team—assigned FOO and party.

(b) Common fire support tasks for close operations include the following:

i. providing defensive, preparatory and covering fire which is responsive, accurate and consistent;

ii. neutralizing or suppressing enemy forces and destroying specific targets;

iii. illuminating portions of the battlefield;

iv. screening friendly movement and blinding enemy positions with battlefield obscurants;

v. marking locations on the battlefield with visual indicators; and

vi. delivering scatterable anti-tank mines in accordance with the barrier plan.

c. **Rear Operations.**

(1) Rear operations assist in providing freedom of action and continuity of operations, logistics and command. Their primary purpose is to sustain the current close and deep operations and to posture the force for future operations. Fire support attack resources, particularly the field artillery, rely heavily on the successful conduct of rear operations to ensure that they are kept adequately re-supplied with combat supplies, particularly ammunition.

(2) On occasion, rear area operations will include the engagement of enemy forces (airmobile/airborne insertions, special forces, irregular forces, etc) by close combat manoeuvre elements. In rear area combat operations the requirement for and tasks of fire support will be the same as for close operations. The primary difference is that fire support assets are not normally dedicated to rear operations. Accordingly, close fire support to rear operations are planned on a contingency basis taking advantage of the fire support system's ability to quickly shift fire to where it is needed.

(3) The primary purpose of fire support in the rear area is to protect the force. In combat operations, rear area fire support is an economy of force effort. Commanders must focus their efforts on protecting the most critical capabilities.

(4) An artillery representative will de designated by the artillery commander to advise, plan and coordinate rear area fire support as required.

THE FIRE SUPPORT SYSTEM

6. The fire support system is an integrated entity composed of a diverse group of components, which must function in a coordinated manner to support the commander's plan. These components include command and control, target acquisition systems and attack resources. The components of the fire support system depicted in figure 2-1 are described in the following paragraphs.

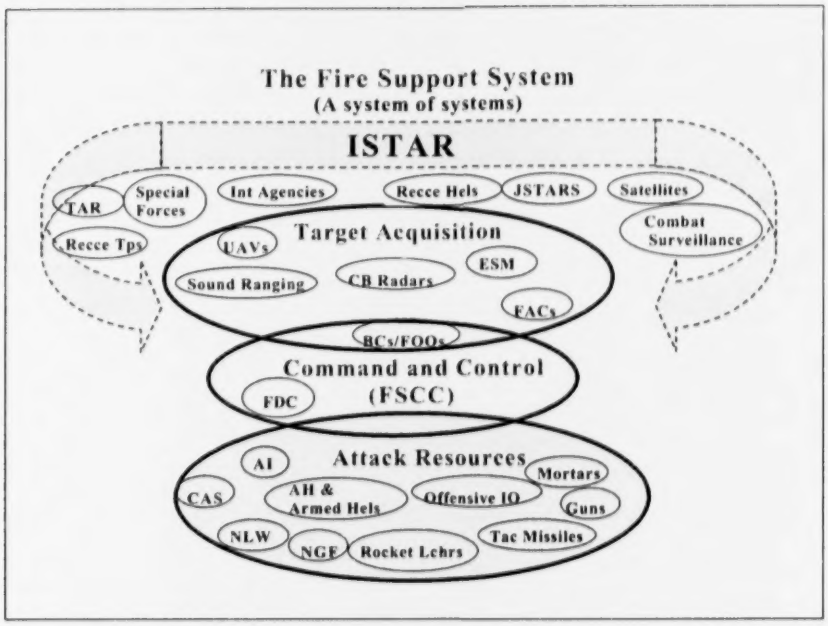

Figure 2-1: The Fire Support System

NOTE

1. Fire Support TA resources are part of the ISTAR system. ISTAR links intelligence, surveillance, TA and reconnaissance to provide the commander with situational awareness, to optimize the detection, location and identification of targets to cue manoeuvre and attack resources.

2. BCs and FOOs perform both TA and fire control coordination functions and therefore span two components of the Fire Support System.

3. Electronic Support Measures (ESM) are defined as that division of EW involving actions taken to search for, intercept and identify electro-magnetic emissions and locate their sources for the purpose of immediate threat recognition.

a. **Command and Control (C2).**

(1) C2 systems bring all information together for collation and decision making. C2 systems, personnel, equipment and a variety of related procedures support the execution of fire missions. The C2 process for employing fire support assets includes fire support planning and coordination, tactical fire direction procedures as well as special procedures for the employment of air and naval attack resources.

(2) The Fire Support Coordination Centre (FSCC) is a centralized location in all manoeuvre headquarters, from battle group to corps and above, at which representatives of fire support elements and other elements with a direct interest in fire support coordination meet. Each representative in the centre has access to communications, which will permit him to implement the necessary coordination. The FSCC is a full time focal point for fire support coordination, but it must not be regarded as the single location where all such coordination occurs. Wherever fire planning and coordination take place the resulting decisions and directions flow back through the FSCC where any further coordination necessary is effected. The required executive action is then taken by the fire support element concerned. The aim is to ensure coordination and not to infringe on the prerogatives of the commanders of the various fire support agencies.

(3) A typical FSCC will include representatives from field and air defence artillery, close air support, aviation and electronic warfare. An engineer representative may also be present, as required, to coordinate the use of scatterable

anti-tank mines for barrier planning. If naval gunfire (NGF) support is available, it will also be represented and, at division level and above, the FSCC will include an airspace coordination centre (ASCC). Within the FSCC, each representative is responsible for the maintenance of up-to-date information on his element, which is required by the other agencies. Each representative will take any action necessary within his delegated authority to ensure effective coordination and integration of his resource with the others, to resolve any conflicts, and to ensure maximum practical safety of all friendly forces. The field artillery forms the basis for an FSCC, with the artillery commander being responsible for the overall coordination of all fire support.

(4) Command and Control Information Systems (C2IS) enable the following functions to take place:

(a) the conduct of all activities associated with the planning, collection, formulation, processing, and distribution of fire support command and fire control information, orders and reports at all levels of command;

(b) the integration of the various fire support elements with the Land Force Command System and joint attack agencies as well eventual interoperability with allied fire support systems;

(c) the collection, processing and distribution of information pertaining to fire support intelligence and target acquisition activities;

(d) the collection, processing and distribution of information pertaining to fire support logistics activities; and

(e) the collection, processing and distribution of information pertaining to survey and meteorological activities.

b. **Target Acquisition (TA).**

(1) TA systems and equipment perform the essential tasks of target detection, location, tracking, identification and classification. The aim of TA is to provide timely and accurate information to enable the attack of specified targets. Targets must be detected, located, identified and prioritized with sufficient speed and accuracy to permit effective engagement. Attack resources obtain target information from both organic and attached TA assets and require access to data gathered by other ISTAR sources. The fire support system consolidates targeting information from many different agencies including manoeuvre forces, intelligence units, special reconnaissance operations and satellites, all of which contribute to the ISTAR system.[2]

(2) Target information may be obtained by the following means:

(a) **Intelligence Agencies.** Intelligence agencies produce and provide

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[2] The TA component of the Fire Support System is both a contributor to and a user of the ISTAR system. An ISTAR system can be defined as a structure within which information collected through systematic observation is integrated with that collected from specific missions and processed in order to meet the commander's intelligence requirements. It also permits the detection and location of targets in sufficient detail and in a timely enough manner to allow their successful engagement by attack resources.

information and intelligence, from a variety of sources, which are of use to the TA component. These agencies include national level/strategic intelligence assets as well as intelligence organizations at all echelons of command down to unit level.

(b) **Combat** Units. Individual units can provide time-sensitive combat information about enemy troops and equipment. Surveillance radars, observation posts and reconnaissance patrols are also useful in collecting information.

(c) **Reconnaissance Units.** Much of the information provided from reconnaissance and combat surveillance is of a time-sensitive nature and is reliant upon an efficient means of transmission and interpretation. Reconnaissance units can engage the targets themselves, hand off the target to a manoeuvre force or call for indirect fire. Additionally, they also have the capability to perform battle damage assessment. Special operations forces collect and report information beyond the sensing capabilities of tactical collection systems by conducting missions to verify the capabilities, intentions and activities of the enemy.

(d) **Locating Devices.** Locating devices are used to determine the accurate locations of enemy C2 facilities, emitters, and attack resources. Locating devices include electronic direction-finding equipment, weapons locators,

such as counter-gun and counter-mortar locating radars, and moving target radars.

(e) **Unmanned Aerial Vehicles (UAV).** UAVs provide timely and highly accurate intelligence required for attacking and assessing high pay-off targets and maintaining surveillance over the battlefield. They can provide a broad range of collection capabilities, including electronic intelligence, radar, electro-optical, infrared imagery and real-time imagery through the use of television. UAVs can also provide laser designation of targets for engagement by attack resources such as artillery and air.

(f) **Aircraft.** Information provided by aircraft is obtained through visual, photographic, radar or infrared means. The information may provide suitable detail for target attack purposes. As part of a coalition force, a Canadian formation may have access to information provided by the Joint Surveillance, Target Attack Radar System (JSTARS). JSTARS is a joint surveillance, targeting and battle management C2 system designed to provide near real time, wide area surveillance and targeting information on moving and stationary ground targets.

(g) **Satellites.** Overhead platforms can provide imagery information from radar, infrared and photographic sensor packages. The examination of imagery and film (imagery interpretation) can be

used to identify and locate enemy installations, equipment, concentrations and activities and deduce their significance.

c. **Attack Resources.** The attack resources of the fire support system include the following:

(1) **Field Artillery.** Field artillery consists of guns, rocket launchers and tactical missiles (e.g. Army Tactical Missile System (ATACMS)). Field artillery provides 24-hour, all-weather, accurate lethal or non-lethal firepower throughout the depth of the battlefield and can be readily massed and then quickly reoriented as necessary. Field artillery characteristics include the following:

(a) the provision of survivable, mobile delivery means capable of firing all types of ammunition, including high explosive projectiles, specialized rounds, such as precision munitions, improved conventional munitions, anti-tank scatterable mines and non-lethal munitions;

(b) the provision of delivery means capable of sustaining high rates of fire, including an eventual burst fire capability, with the potential for first round hit accuracy and sufficient consistency to provide safe fire support to close combat troops; and

(c) the provision of a highly responsive and effective firepower for the engagement of targets in support of deep and rear operations as required.

(2) **Mortars.** Mortars are the infantry battalion's organic fire support means. Mortars can engage targets with high explosive, smoke and illuminating ammunition. Mortar characteristics include a high rate of fire, rapid response to calls for fire and good tactical mobility.

(3) **Attack and Armed Helicopters.**

(a) An attack helicopter (AH), such as the US Army AH-64 Apache, is a helicopter specifically designed to employ various weapons to attack and destroy enemy targets. An armed helicopter is one fitted with weapons or weapon systems such as the British Army's Lynx/TOW, a utility helicopter fitted with an anti-armour capability. AH have full combat capability while armed helicopters have a limited combat capability.

(b) AH have the firepower, reaction time, mobility and ability to engage targets with precision while providing the formation commander with a responsive and lethal deep strike capability. AH can be employed to defeat large concentrations of enemy armour or any other designated high payoff target, especially when synchronized with CAS, artillery and EW. AH assets may be assigned to a Canadian formation from an allied higher formation, which will provide a liaison officer to the Canadian headquarters. Detailed planning and coordination of these operations will be conducted by the aviation cell within the Canadian formation's FSCC.

(4) **Air.**

(a) Tactical air operations involve the use of high performance, multi-role fighter aircraft, under the operational control of the air component, to support land force operations. High performance aircraft can carry a wide range of munitions including bombs, rockets, cannon, missiles, EW assets and precision guided munitions, for overhead release or stand off delivery. Tactical air operations have three firepower related components as follows:

i. **Air Interdiction (AI).** AI operations are defined as those conducted to delay, isolate, neutralize or destroy the enemy's military potential before it is brought to bear effectively against friendly forces. AI is conducted at such a distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required.

ii. **Close Air Support (CAS).** CAS is air action against targets that directly affect the course of the land battle and are in close proximity to friendly land forces. CAS requires detailed integration of each air mission with the fire and movement of the land forces concerned. Tactical air reconnaissance (TAR) is a component of CAS and consists of the collection of information either by visual means from the air or

through the use of airborne sensors. This data is used to provide information on the disposition, composition, location, activities and movements of hostile forces and electronic emissions. When available, TAR may be utilized for the conduct of post attack assessments.

iii. **Armed Reconnaissance.** Armed reconnaissance is defined as air missions flown with the primary purpose of locating and attacking targets of opportunity (ie. enemy materiel, personnel and facilities in assigned general areas or along assigned communications routes). It is a form of air interdiction against opportunity targets.

(b) Air support planning and coordination is achieved through the provision of a Tactical Air Control Party (TACP), an air support control agency which may be found at any level between battle group and corps. CAS operations are directed from a forward position by forward air controllers (FAC) who provide advice, planning and coordination on air support matters to the ground tactical commander.

(5) **Naval Gunfire.**

(a) When naval gunfire fire (NGF) support is available and the general tactical situation permits its use, naval firepower can provide large volumes of highly responsive fire support to combat troops operating near coastal waters.

Naval spotters or observers may be specially attached to the supported troops for the purpose of controlling naval gunfire or the task may be assigned to artillery FOOs. The naval officer responsible for coordinating NGF in support of land operations commands the fire support ships from the Supporting Arms Coordination Centre (SACC) in his command ship.

(b) Naval gunfire has the advantages of a variety of munitions and a high rate of fire, mobility and a flat trajectory, which is effective against vertical face targets such as coastal bunkers. Limitations include a large range probable error, due to high muzzle velocity and flat trajectory, and unfavourable hydrographic conditions, which may force the ship into undesirable firing positions. Other disadvantages include ship fixation and navigation errors, particularly in rough seas and bad weather conditions, limited quantities of ammunition and ship to shore radio communication limitations.

(6) **Offensive IO.**

(a) Offensive IO is defined as actions taken to prevent effective C2 of enemy forces by denying information through influencing, degrading, or destroying the enemy's C2 system. Offensive IO may also be used to influence the beliefs of hostile persons, ie. to attack on the moral plane. Offensive IO achieves these objectives in the following manner:

i. by denying information to the enemy through destruction of his collection means, by influencing the information he gets or by causing him not to collect at all;

ii. by influencing and manipulating the enemy's perceptions and causing disorientation of his decision cycle;

iii. by degrading the enemy's IO through selective disruption of his Command Control Information Systems (CCIS); and

iv. by neutralizing or physically destroying the enemy 's communication nodes and links.

(b) The elements of Offensive IO include the following:

i. electronic counter measures (ECM[3]);

ii. computer network attack (CNA); and

iii. physical destruction.

(c) Additional detail on the subject Offensive IO is found in B-GL-300-005/FP-001, *Information Operations*.

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[3] ECM is the attack component of EW. ECM is defined as that division of EW involving actions taken to prevent or reduce an enemy's effective use of the electromagnetic (EM) spectrum, through the use of EM energy. There are three sub-divisions of ECM: electronic jamming, electronic deception and electromagnetic neutralization.

(7) **Non-lethal Weapons (NLW).** NLW are weapons designed and employed to incapacitate personnel or materiel while minimizing fatalities, permanent injury to personnel and undesired damage to property and the environment. Non-lethal effects can be delivered by a variety of attack resources such as gun and rocket artillery and aircraft. Chapter 5 of this publication provides a detailed description of NLW capabilities.

FIRE SUPPORT COORDINATION

7. The integration and synchronization of fire support with the commander's battle plan is achieved through the process of fire support planning and coordination. Formal planning and coordination binds the fire support resources together in a common effort with the aim of attacking targets with the most effective and efficient attack resource(s) in accordance with the commander's intent. In coordinating fire support, cooperation among the various fire support agencies is necessary for the effective delivery of fire. Fire support coordination is conducted at all levels of command from combat team and up.

8. Fire support activities must be integrated with the commander's plan and are based on the following principles:

a. The manoeuvre commander retains the authority and responsibility to direct target priorities, levels of effort and the sequence of those efforts. At corps level and below, the field artillery commander is responsible for ensuring that all available means of fire support are fully integrated and synchronized with the operational plan and are in accordance with the commander's guidance. He serves as the commander's fire support coordinator and speaks for the commander on all matters pertaining to fire support.

b. The fire support system must operate as one force. The successful delivery of fire support requires the close coordination of command, control, communications,

intelligence and fire support system attack resources with the necessary service support functions.

c. The fire support system must be responsive to the needs of the commander. The activities of each fire support agency must be focused on the attainment of the commander's mission. This is achieved through concurrent planning based on the commander's intent and concept of operations.

9. Field artillery commanders at corps, division and manoeuvre brigade levels supervise the operation of their FSCCs in addition to commanding their respective field artillery organizations. Field artillery is organized at these levels with a specific command and control structure that enables the field artillery commander to accomplish both aspects of his mission.

10. It is the responsibility of the artillery commander at each level to carry out fire support coordination on behalf of the supported arms commander. To effect the required coordination, the artillery commander establishes a FSCC within the operations centre of the supported unit or formation headquarters. The FSCC consists of one common operations centre with representatives and communications from all available indirect fire support agencies. The artillery commander is responsible for the operation of the FSCC

11. The artillery commander advises the supported commander on the employment of all fire support attack resources. These resources must be employed so that each is used to best advantage, in the most effective and efficient manner, and such that all conflicting demands are resolved. This requires that the FSCC coordinate the fire support in accordance with the following guidelines:

a. Requests for fire support are assigned to the agency that can deliver the most effective fire in time.

b. Fire support requests and calls for fire are submitted directly to the agency that will deliver the fire if a representative is present. If no representative is present, the request is submitted to the next higher headquarters.

c. The type of fire support furnished must meet the wishes of the supported arm commander. If the commander's request cannot be met, viable alternatives must be suggested and provided.

d. Care must be taken to safeguard friendly forces.

12. The FSCC carries out the following functions:

a. **Advice.** Advice to the supported commander and staff is provided on the capabilities and use of all fire support attack resources. Air defence advice is also provided by the AD cell within the FSCC.

b. **Coordination.** Fire Support coordination involves the following aspects:

(1) the planning and coordination of all fire support within and in support of the formation or unit;

(2) the coordination of fire support with adjacent units/formations; and

(3) the coordination of airspace control measures through the ASCC at brigade and above.

c. **Allotment of Resources.** The FSCC allots and prioritizes fire support attack resources in order to support the commander's plan. This includes the processing of fire support requirements from resources external to the supported formation.

13. If naval, air, or aviation liaison officers are attached to ground headquarters to provide expert advice and planning for their respective support, they will become part of the appropriate FSCC. It is unlikely, however, that they will be assigned at a level lower than brigade. If no air, aviation or naval representative is available at the appropriate FSCC, the artillery representative will carry out their fire support coordination functions.

ROLE OF THE ARTILLERY COMMANDER

14. At every level, the artillery commander must understand his supported commander's mission, intent and concept of operations in order to properly apply the fire support resources necessary for the success of the operational plan. The artillery commander is both an advisor to his supported arm commander and a commander in his own right. He carries out his own fire support estimate, as well as being intimately involved in his commander's planning process. It is therefore necessary that he achieve an appropriate balance in terms of time and effort between conducting his own planning process and contributing to his commander's. The functions that the artillery commander must perform are as follows:

a. **Interpret.** The artillery commander must fully assimilate the information he receives and completely comprehend the mission of the supported commander. He must understand the concept of operations (intent, scheme of manoeuvre and end state) of their mutual superior commander and the commander two levels up.

b. **Advise.** The artillery commander must use his knowledge of the fire support TA and attack resources available to him to advise the commander and develop the fire support necessary for the commander's plan.

c. **Integrate.** The artillery commander must integrate the fire support attack resources into the operational plan. The process of fire support integration is illustrated in the following graphic:

Figure 2-2: The Artillery Commander's Functions in Developing the Commander's Plan

FIRE SUPPORT PLANNING PROCESS

15. The planning process begins with the preparation of the commander's mission analysis and estimate. The artillery commander is with the commander throughout the estimate process and is closely involved in discussions that the commander has with other members of the staff. With an early and comprehensive view of the developing operation, he is able to issue his own warning order and give detailed direction to his staff to allow concurrent activity to take place. The supported commander's plan should include the fire support missions and tasks to enable detailed planning of deployment, resource allocation and logistic resupply to be undertaken by the artillery staff. Where appropriate, it should also detail the mission for the conduct of deep operations.

16. Once the outline operational plan is firm, the artillery commander, having conducted his own estimate, issues guidance to his staff in the form of an outline fire support plan from which the final artillery operation order will be produced.

17. The planning process culminates in the production and confirmation of orders. At division level, this will normally involve the production of a fire support operation order or annex to the main operation order; at brigade level an artillery sub-paragraph to the operations order is normally sufficient. All artillery headquarters and units supporting an operation must receive artillery specific orders.

18. During the formulation of the plan and the production of orders, it is essential that the artillery commander's staff consult with other staff cells, particularly regarding movement, terrain allocation and ammunition resupply. Close coordination is also required for the support of non-artillery ISTAR/attack resources, such as offensive air support, aviation, reconnaissance and offensive IO.

FIRE PLANNING

19. Fire planning is the continual process of analysing, allocating, and scheduling fire support and is an integral part of the commander's battle procedure. The aim of fire planning is to integrate fire support effectively into battle plans in order to optimize combat power. To accomplish this aim, fire support planning is done concurrently with battle procedure at all levels and for deep, close and rear operations. Fire planning must be flexible to accommodate the unexpected in combat and to facilitate rapid change. It encompasses the massing of fire support assets, changes in the force mission, resupply, target acquisition and target engagement. It involves the synchronization of collective and coordinated fire support resources to focus the fire support effort exactly where the manoeuvre commander intends to fight the battle.

20. Targeting and fire planning are two separate but complementary processes. Targeting is a formal staff process comprising a series of activities and related products inherent to the operation planning process (OPP). Targeting is a continuous and cyclical activity by which the identification and engagement of priority targets is facilitated. It assists the commander in deciding what to attack with his fire support system, how to

acquire these targets and how to attack them. Fire planning is more of a linear process with a beginning and an end. Fire planning is conducted for a specific operation, normally in support of close operations. Fire plans are prepared at all levels and may support a deep or even rear operation. A fire plan consists of targets, which are critical to the attainment of the manoeuvre commander's plan. These targets may or may not have been initially designated to be priority targets, as determined through the targeting process. A fire plan is the tactical plan to effect the engagement of these targets.

FIRE SUPPORT COORDINATION MEASURES

21. Integral to fire support coordination is the requirement to ensure the safety of our own troops against the effects of friendly fire. The FSCC coordinates all fire support impacting in the area of responsibility of the manoeuvre force that it is supporting. The FSCC will ensure that fire support will not jeopardize troop safety, is synchronized with other fire support means and /or will not disrupt the operations of adjacent friendly units. Fire support coordination measures (FSCM) assist in achieving these aims.

22. The following FSCM are in effect:

a. **Fire Support Coordination Line (FSCL).** A line established by the appropriate ground commander (e.g. corps), in coordination with the appropriate tactical air commander and other supporting elements, to ensure coordination of fire not under his control but which may affect current tactical operations. The FSCL is used to coordinate the fire of air, ground or sea weapon systems using any type of ammunition against surface targets. When detached forces are beyond the FSCL, appropriate fire coordination measures should be established around the detached forces. Supporting elements may attack beyond the FSCL provided that the weapons used do not produce effects on or to the rear of the line. Attacks behind this line must be coordinated with the appropriate ground force commander, except that fire that has been cleared by other means, such as a No Fire Line (NFL), requires no further coordination. The FSCL should be

easy to define on a map and easily recognised from the ground and air.

b. **No Fire Line (NFL).** A line short of which indirect fire systems do not fire except on request or approval of the commander who established the line, but beyond which they may fire at any time without danger to friendly troops. The NFL is used to expedite the quick attack of targets beyond it by fire support units (of higher levels), without the delay of unnecessary coordination but also to guarantee that no targets are attacked short of it without coordination with the responsible manoeuvre commander. The NFL is normally established by the commanders of division or brigade size forces. On occasion, the commander of a battalion-sized force may establish a NFL. Some NATO nations refer to this measure as the Fire Support Safety Line (FSSL).

c. **Free Fire Area (FFA).** A specific designated area into which any weapon system may fire (to empty guns, etc) without additional coordination with the establishing headquarters. The FFA is also used to facilitate the jettison of munitions when aircraft are unable to drop them on a target area. The area is usually established by a division or higher commander following coordination with the host nation, if appropriate. It is located on identifiable terrain when possible or designated by grid coordinates.

d. **Restrictive Fire Line (RFL).** A line established between converging friendly forces (one or both may be moving) that prohibits all fire or effects from fire across the line without coordination with the affected force. The purpose of the line is to prevent fratricide and duplication of attacks by converging forces. The line is established by the HQ that controls both forces, based on submissions from them. This line is located on identifiable terrain, usually closer to the stationary force.

e. **Restricted Fire Area (RFA).** An area in which specific restrictions are imposed and in which fire that exceeds

those restrictions will not be delivered without coordination with the establishing headquarters. An RFA is established by a manoeuvre battalion or a larger ground forces or by an independently operating company. Usually, it is located on identifiable terrain, by a grid reference or a radius (in metres) from a centre point.

f. **No Fire Area (NFA).** An area usually established by a division or corps, into which no fire or the effects of fire are allowed. Two exceptions are:

(1) when the establishing headquarters approves fire temporarily within the NFA on a mission-by-mission basis; and

(2) when an enemy force within the NFA engages friendly troops the friendly force commander may engage the enemy to defend his force.

The NFA is located on identifiable terrain, when possible.

g. **Airspace Coordination Area.** A restricted area or route of travel specified for use by friendly aircraft and established for the purpose of preventing friendly aircraft from being fired on by friendly forces. The purpose of the Airspace Coordination Area is to allow simultaneous attack of targets near each other by multiple fire support means, one of which normally is air. An Airspace Coordination Area is established by the FSCC at brigade level and higher. The area will be designated by timings, grid references of a centreline, width on either side of this line, and a maximum and minimum altitude in feet. An Airspace Coordination Area is placed on call and fire will not be delivered through it without the permission of the FSCC that ordered its adoption.

23. In addition to the above measures, unit and formation boundaries also serve a coordination function. Boundaries are used by the manoeuvre commander to indicate the geographical area for which a particular unit is responsible. They describe a zone of action or sector of responsibility for a manoeuvre unit. Normally, they are designated along easily recognizable

terrain features. Boundaries are both permissive and restrictive in nature. They are restrictive in that no fire may be delivered across a boundary unless the fire is coordinated with the force having responsibility within the boundary, or unless a permissive fire support coordinating measure is in effect that would allow firing without further coordination. Boundaries are permissive in that a manoeuvre commander, unless otherwise restricted, enjoys complete freedom of fire and manoeuvre within his own boundaries. Normal unit and formation boundaries, extended into enemy territory, establish the lateral limits for coordination. Rear boundaries must also be respected.

SUMMARY

24. Fire support involves the collective and coordinated use of land, air and sea-based TA and attack resources in support of the operational plan. Fire support encompasses the integration and synchronization of fire and weapon effects to delay, disrupt or destroy enemy forces, combat functions and facilities in order to attain operational and tactical objectives. It plays a key role in the dynamic forces of fixing and striking within the framework of deep, close and rear operations.

25. The activities of the fire support system must be closely integrated with the manoeuvre commander's concept of operations and plan. The constituent components of the system must action in unison and must be responsive to the needs of the supported unit or formation commander. Fire support coordination, which is the responsibility of the senior artillery commander, enables the necessary advice, planning and execution of fire support so that the right targets are attacked to achieve the manoeuvre commander's intended effects. To effect the required coordination, the artillery commander establishes an FSCC within the operations centre of the supported unit or formation headquarters. The coordination process is further refined by the use of fire support coordination measures, which set conditions on the application of fire within designated areas.

26. Further detail on the subject of fire support may be obtained from the following reference manuals:

a. BGL-371-001/FP-001, *Field Artillery Doctrine*; and

b. STANAG 2934 A ARTY P-1, *Artillery Procedures.*

CHAPTER 3
THE TARGETING PROCESS

A superiority of fire, and therefore a superiority in directing and delivering fire and in making use of fire, will become the main factors upon which the efficiency of a force will depend.

Marshal of France Ferdinand Foch, Precepts and Judgements, 1919

INTRODUCTION

1. Targeting is defined as "the process of selecting targets and matching the appropriate response to them taking account of operational requirements and capabilities" (AAP-6). The targeting process assists the Commander by determining which targets are to be acquired and attacked, when they are to be attacked, and what is required to defeat the target. The methodology facilitates the coordination of ISTAR and attack resources such as air, aviation, indirect fire and offensive IO ensuring that they are properly integrated and that the most effective engagement means is used to attack each target.

2. A target is an enemy function, formation or equipment, facility or terrain, planned for destruction, neutralization, or suppression in order to delay, disrupt, divert, limit or destroy the enemy. The emphasis of targeting is on identifying resources that the enemy can least afford to lose for each phase of the battle. Denying these resources to the enemy strips him of the initiative and forces him to conform to friendly battle plans.

3. Targeting is a dynamic and continuous process that lends itself to a systematic and analytical approach to the attack of important targets. The targeting process provides an effective method for matching the friendly force capabilities against enemy targets. The objectives of targeting must be easily understood across the combined and joint environment. Targeting objectives must focus assets on enemy capabilities that could interfere with the achievement of friendly missions.

TARGETING AND THE LAW OF ARMED CONFLICT

4. In accordance with the LOAC military operations shall be directed only against legitimate targets. The LOAC has developed principles and definitions to ensure that military forces select targets that are legitimate targets. Legitimate targets include military objectives, combatants and unlawful combatants.[1] The targets are defined as follows:

a. **Military Objectives.**

(1) These are objects (including a specific area of land) which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization offer a definite military advantage.

(2) The following are generally accepted as being military objectives:

(a) military bases, warehouses, petroleum storage areas, ports and airfields;

(b) military aircraft, weapons, ammunition, and structures that provide administrative and logistic support for military operations; and

(c) civilian vessels, aircraft, vehicles and buildings if they contain combatants, military equipment or supplies.

b. **Combatants.** Combatants are legitimate targets and may be attacked unless they have been captured, surrendered, expressed a clear intention to surrender or are *hors de combat* (ie. out of combat, such as a prisoner of war)

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[1] See B-GG-005-027/AF-020—*Legal Support*, Volume 2, *Law of Armed Conflict*, Chapter 3 (Combatant Status) for more detail on this subject.

provided they refrain from hostile acts and do not attempt to escape. Combatants include any member of the armed forces, except medical and religious personnel. Other persons qualifying as combatants under the LOAC include the following:

(1) militias, volunteer groups and organized resistance movements;

(2) levée en masse[2]; and

(3) paramilitary or armed law enforcement agencies incorporated into a nation's armed forces.

c. **Unlawful Combatants.** Unlawful combatants are those who take a direct part in hostilities without having the legal right to do so under the LOAC. Unlawful combatants are legitimate targets for such time as they take part in hostilities. They include the following:

(1) civilians who take a direct part in hostilities (except those who are lawful combatants because they are participating in a levée en masse);

(2) mercenaries; and

(3) spies.

5. Targeting principles in accordance with the LOAC are as follows:

a. **Proportionality.**

(1) The fact that an attack on a legitimate target may cause civilian casualties or damage to civilian objects does not necessarily make the attack

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[2] A levée en masse is the term used to describe the formation of body of civilians who, on the approach of the enemy, spontaneously take up arms openly, and in accordance with the LOAC, to resist the invading forces.

unlawful under the LOAC. However, such collateral civilian damage must not be disproportionate to the concrete and direct military advantage anticipated from the attack.

(2) If an attack is expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects or a combination thereof which would be excessive in relation to the concrete and direct military advantage anticipated, then the attack must be cancelled or suspended. This is known as the proportionality test, which must be used in the selection of all targets.

b. **Obligations Related to Targeting.** Under the LOAC commanders, planners and staff officers have the following obligations:

(1) to do everything feasible to verify that the objectives to be attacked are in fact legitimate targets and are not entitled to special protection under the LOAC;

(2) to take all feasible precautions in the choice of means and methods of attack to avoid, and in any event to minimize, collateral civilian damage; and

(3) to refrain from launching any attack which may be expected to cause collateral civilian damage which would be excessive in relation to the concrete and direct military advantage anticipated (proportionality test).

APPLICATION

6. In the past, targeting was relatively simple. Most targets were acquired visually by artillery observers accompanying manoeuvre units. Targets developed by intelligence assets were usually static and could be dealt with through planned artillery programs. There were usually

sufficient assets available to engage most of the targets acquired. Weapons systems capabilities generally exceeded target acquisition capabilities. Consequently, a significant effort was devoted to exploit technological advances to improve the ability to find more targets at deeper ranges.

7. The current ability to accurately locate a large array of targets at extended ranges places an increased burden on our attack resources. Future target acquisition systems will compound this problem by providing targeting information on highly mobile targets, which may become useless unless quickly acted upon.

8. If the fire support system cannot attack all the targets the acquisition assets find, nor attack targets within a suitable time frame, it cannot adequately support the manoeuvre commander or his plan. The targeting process must therefore, focus on the attack of those targets whose loss will have the greatest impact on the enemy, and do so at the time when that attack will produce the greatest benefit for the friendly commander.

9. The principles of targeting may be applied at all levels of command in all operations of war. However, the process requires considerable time, staff effort and access to the full range of target acquisition and attack resources to be truly effective. It is optimized for the engagement of targets in depth, however this does not preclude the nomination of targets in close and rear operations as necessitated by a non-linear battlefield. The targeting process is primarily applicable at corps and division and, to a lesser extent, at brigade, for it is at these levels that appropriate target acquisition and attack resources exist. The process remains valid at the battle group level however, the procedures are informal and may not result in written products.

TARGETING CONCEPT

10. Targeting is an integral part of the operation planning process. The process begins with the receipt of a task for the formation or unit and continues through the development and execution of the plan.

11. The targeting process supports the Commander's decision making. It helps to determine which targets must be acquired and attacked and the best attack option (lethal or non-lethal) to use to engage the targets. During the process, as many decisions as possible are made during the planning

stage so that once an operation has begun, action can be taken by the staff without reference to the commander for a decision. Targets can therefore be engaged as soon as they are acquired consistent with the commander's pre-determined intent for targeting.

TARGETING IN A JOINT ENVIRONMENT

12. Operations involving Canadian land forces will be, in most cases, joint and combined in nature. The joint force commander (JFC) will aim to synchronize the action of air, land and sea forces to achieve strategic and operational objectives through integrated joint campaigns and major operations.

13. Each service has established unique doctrine and tactics, techniques, and procedures (TTP) for targeting. Where the habitual integration of resources from one or more services support the targeting requirements of another service, arrangements for the common understanding of the targeting process have been developed. Targeting at all levels of the joint force is a complex process requiring close coordination. Existing service procedures for the acquisition, selection, and attack of targets have four things in common as follows:

a. deciding in advance what is to be targeted;

b. locating the target;

c. attacking the target; and

d. assessing the results of the attack.

14. This common approach to targeting mirrors the decide, detect, deliver and assess targeting functions presented in this chapter. The organizational challenge for the JFC is to effectively focus the targeting effort of the service components of the joint force for operational level targets without degrading their primary mission of support to their respective components.

15. From the JFC's perspective, a target is selected for strategic and/or operational reasons. A decision is subsequently made whether to attack the target and, if it is to be attacked, which system will attack it. The targets

selected or nominated in this process must support the JFC's campaign plan and contribute to the success of present and future major operations. The JFC relies on his tactical level commanders to effectively orchestrate the targeting process. Control measures, such as a FSCL, must be repositioned as needed to take full advantage of all assets available to the JFC. He best influences the outcome of future tactical battles by setting the conditions for those battles and allocating resources to the service components.

16. The capabilities of the ground and air component commanders overlap. Both have deep ISTAR and attack assets, and the capabilities of the systems of one service complement the capabilities of the other. Therefore, both air and ground systems must be synchronized to gain the greatest efficiency and technological advantage. This requires air and ground component commanders and their staffs to share the effort in acquiring and attacking targets throughout the battlefield.

17. The JFC establishes broad planning objectives and guidance for the integration of fire from joint force resources. He provides guidance for the campaign as a whole and for phases or major operations within the campaign. Subordinate commanders recommend how to use their combat power more effectively to achieve joint force objectives. With the advice of subordinate commanders, JFCs set priorities, provide targeting guidance, set objectives, and determine the weight of effort for various operations.

18. JFCs may organize their staffs to oversee targeting functions or may delegate the responsibility to a subordinate commander. Typically, a JFC will organize a joint targeting coordination board (JTCB). The JTCB is a joint activity comprised of representatives from the staff, all components and, if required, their subordinate units. Tasks for the JTCB include the following:

a. the review of target information;

b. the development of targeting guidance and priorities; and

c. the preparation and refinement of joint target lists.

19. The JTCB has a macro level overview with emphasis on the operational level of war. The JTCB helps the JFC develop and communicate priorities and apportionment decisions. It does not select specific targets or methods of attack. The JTCB also reviews restricted

targets and areas where special operations forces are operating to avoid endangering current or future operations. Before and during sustained operations, component commanders recommend to the JTCB priorities for battle damage assessment (BDA) within their boundaries.

20. The service components, such as a division within a corps, identify requirements and nominate targets that are outside their boundaries, or exceed the capabilities of organic and supporting assets, to the JCTB. The requirements and target nominations are made on the basis of the JFC's apportionment of attack resources. After the JFC makes the targeting and apportionment decisions, components plan and execute assigned missions. Any target that is questionable from the perspective of the LOAC or the rules of engagement (ROE), must be referred, through the chain of command, to the higher headquarters and ultimately the JTCB as appropriate.

21. Additional information on Joint Targeting is found in B-GL-333-001/FP-001, *Formation Standing Operating Procedures*. The remainder of this chapter is focused on the conduct of the targeting process at the tactical level with emphasis at the division and brigade.

THE TARGETING TEAM

22. The targeting process requires the coordinated work of several staff branches in a headquarters under the direction of a central coordinating authority. While the Commander is ultimately responsible for targeting, this responsibility will be delegated, usually to a senior artillery officer, who will require a dedicated staff to complete the detailed staff work. At division, brigade and battle group levels the targeting team is chaired by the G3 Deep Operations, the CO of the DS field artillery regiment and the affiliated field artillery battery commander (BC) respectively.

23. Targeting team personnel are members of the commander's operational and specialist staffs. They perform the targeting process as part of their normal responsibilities within the decision making process. Fire support, intelligence and operations officers form the core of the targeting team at each level. As required, other representatives within the operational headquarters may also be members of the targeting team. The members of the targeting team include the following:

a. **Core Members.**

(1) Team Chairman (as indicated above);

(2) G3 or representative;

(3) G2;

(4) Targeting Officer (usually a member of the formation FSCC staff); and

(5) division/brigade artillery intelligence officer (DAIO/BAIO).

b. **Members as Required.**

(1) G3 Aviation;

(2) G3 Air;

(3) air defence representative;

(4) information operations representative;

(5) engineer representative;

(6) G5 representative; and

(7) liaison officers (flanking and subordinate formations/units).

24. The targeting team meets as frequently as necessary. Targeting is a dynamic process and must keep up with the changing face and tempo of the battlefield. The products produced as a result of targeting must be continually updated on the basis of combat assessment and situation development. The core members (chairman, targeting officer, G2, artillery intelligence officer and G3 representative) closely monitor the targeting situation and are available to convene the team on short notice as required.

25. At division level, the targeting process is carried out within the deep operations coordination centre (DOCC). The DOCC is located at the

main command post and acts as a focal point for the planning, coordination, synchronization and execution of the division deep operations. The DOCC acts as a battle command and control facility providing the commander with a means to focus the activities of all the units, agencies and cells involved in supporting deep operations. The DOCC is comprised of individuals representing current operations, plans, intelligence, combat service support (CSS) and FSCC (including air, aviation and air defence) cells under the supervision of the G3 Deep Operations. DOCC members provide the essential coordination interface with their affiliated cells and their responsibilities reflect the deep operations concerns of their areas of specialization.

26. The DOCC works directly for the formation chief of staff, who on behalf of the commander, is the approving authority for deep operations. The DOCC stays abreast of the status of close and rear operations and continually assesses the relationship of these activities with deep operations criteria. Through the targeting process, targets are selected and detection assets are allocated and employed. Below division level, the targeting function is resident in the applicable FSCC.

TARGETING OBJECTIVES

27. The objectives of targeting must be articulated simply and clearly and must be easily understood across the joint and combined environment. Targeting objectives must focus assets on enemy capabilities that could interfere with the achievement of friendly objectives. Terms such as *limit, disrupt, delay, divert,* and *destroy* are used to describe the desired outcome of an attack on an enemy capability. They should not be confused with the terms *harassment, suppression, neutralization* or *destruction* which are used as attack criteria to determine the degree of damage or duration of effects on a specific target.

28. Targeting objectives are described as follows:

a. **Limit.** Limiting enemy capabilities means reducing the options or COA available to the enemy commander. For example, the use of CAS and field artillery may be used to limit the use of one or more avenues of approach available to the enemy.

b. **Disrupt.** Disruption denies the enemy the efficient interaction of his combat and combat support systems. It forces the enemy into ineffective tactical dispositions and degrades the movement of materiel and forces.

c. **Delay.** This objective alters the time of arrival of forces at a point on the battlefield or the ability of the enemy to project combat power from a point on the battlefield.

d. **Divert.** This is an interdiction measure, which addresses the commander's desire to tie up critical enemy resources. The attack of certain interdiction targets may result in the enemy commander diverting capabilities or assets from one area or activity to another. The diversion of these resources indirectly reduces the capability of the enemy commander to continue his plans.

e. **Destroy.** As a targeting objective, this action calls for ruining the structure, organic existence or condition of an enemy target that is essential to an enemy capability. Describing destruction as an objective requires establishing specific destruction percentages or quantities within the ability of the weapon system or systems.

TARGETING METHODOLOGY

29. The targeting methodology is characterized by four related functions known as decide, detect (including the requirement to track the target), deliver and assess. The targeting process is closely associated with Intelligence Preparation of the Battlefield (IPB), the continuous analysis of the enemy, weather and terrain in the area of operations. IPB provides much of the information for targeting in that it evaluates enemy capabilities and predicts enemy courses of action (COAs) with respect to battlefield conditions.

30. While not a member of the targeting team per se, the manoeuvre commander directs the targeting effort by issuing his mission statement, intent, and the concept of operations. The process begins with the commander's guidance regarding the following:

a. what he expects the formation/unit to do;

b. what he feels are the most important targets; and

c. what general effects he wants to have on those targets.

DECIDE FUNCTION

31. The decide function is the cornerstone of the targeting process and requires close coordination between the commander and the intelligence, plans, operations and targeting team elements. The process begins with receipt of a mission, whether assigned by higher headquarters or deduced by the commander. The commander, with input from his staff, analyses the mission and considers the tasks that must be performed. Targeting priorities must be addressed for each phase or critical event of an operation. The decisions made are reflected in visual products and clearly convey the commander's intent with respect to the following priorities:

a. the tasking of ISTAR assets;

b. information processing;

c. target selection;

d. selection of the engagement means; and

e. the requirement for BDA.

32. There are six distinct steps in the Decide function as follows:

a. **Step 1 - Identify Key Target Areas.**

(1) In Step 3 of IPB[3]—*Evaluate the Enemy*— the G2 determines the capabilities of the enemy force.

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[3] The four steps in IPB are as follows: Define the Battlefield Environment, Describe the Battlefield Effects, Evaluate the Enemy and Determine the Enemy Courses of Action.

The G2 will evaluate the doctrine, tactics, equipment, organizations and expected behaviour of the enemy expected to be operating in the area of operations and area of interest. During this stage of IPB, the G2 converts enemy doctrine, or patterns of operation, to graphics or doctrinal templates and identifies the enemy's capabilities and high value targets (HVTs). HVTs are those targets, which the enemy commander is likely to need for the completion of his mission and are therefore, of high value t o him. The HVTs identified during this step are passed to the targeting team for further refinement.

(2) In Step 4 of IPB—*Determine the Enemy Courses of Action*—the G2 develops situation templates (overlays) for each enemy course of action (COA), and an event template (a consolidation of situation templates[4]). From the event template Named Areas of Interest (NAI) and time phase lines,[5] along each avenue of approach and mobility corridor, are determined. A NAI is an area along an avenue of approach or mobility corridor where enemy activity, or lack of it, will confirm or deny an enemy COA. Designating NAIs focuses the information collection effort on viable enemy options without wasting coverage on areas of little importance. This results in a

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[4] Situation Templates are course of action overlays, which depict the enemy's initial array of forces and the array of forces for subsequent stages of an operation. Situation templates are produced by combining the doctrinal enemy template with weather and terrain information.

[5] Time phase lines are estimates of the rate of advance (enemy and friendly) and help trace the estimated forward line of friendly forces (FLOT) at any given time. During actual operations, they are adjusted to reflect actual enemy and/or friendly movements in the given situation. From the targeting perspective, they help determine when high pay-off targets (HPTs) will be vulnerable to attack.

draft information plan, which will eventually lead to the ISTAR plan.

(3) As IPB progresses, the G2 identifies the full set of threat COAs, in priority and identifies the initial information requirements. On completion of Step 4 the COAs war-game may be conducted.

b. **Step 2 - Identify Key Target Types.**

(1) During the COAs war-game each enemy COA is war-gamed against each friendly COA and from the results a Decision Support Template (DST) is developed. The DST identifies critical battlefield areas, including TAIs and events and activities that require tactical decisions by time and location. A Target Area of Interest (TAI) is an engagement point or area where the commander can influence the battle by destroying, delaying or disrupting the enemy. This can be achieved by fire, manoeuvre or other means such as offensive IO.

(2) Decision Points (DPs) are identified after TAIs are selected. They specify events, areas and points on the battlefield and where and when tactical decisions are required by the friendly commander to effect a result in a particular TAI. DPs are used as trigger points to initiate action into a related TAI.

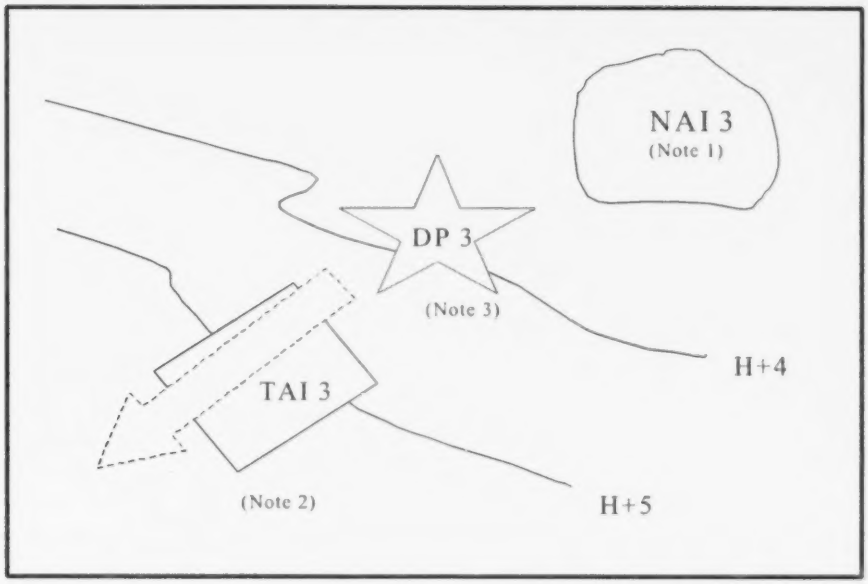


Figure 3-1: Relationship Between a Decision Point and Target Area of Interest

NOTES

1. A NAI is designated for watching enemy activity. In the above example the nature of the enemy activity in NAI 3 indicates that the enemy has adopted a particular COA.

2. A TAI is an engagement area where the engagement of an enemy force by fire, manoeuvre or electronic attack, will reduce or deprive it of some capability. TAIs are often represented as killing zones and can indicate where potential HPTs might be most vulnerable to attack. The TAI in the above example corresponds to the enemy's chosen COA. Examples of TAIs include bridges, choke points, drop zones and landing zones, known fording sites, etc.

3. In the above example, DP 3 is the trigger for the decision to launch a strike against the enemy in TAI 3.

(3) HVTs identified during the IPB process are further analysed during the COAs war-game. HVTs are upgraded to HPTs if their destruction would contribute substantially to the success of friendly operations. Key in the decision to upgrade HVTs to HPTs is the friendly force's ability to acquire the target, the degree of

accuracy with which it can be identified and the ability to engage and defeat the target, and the resources to required to do so. HPTs will be further prioritized into a HPTs List (HPTL).

(4) HPTs may be given different priorities at different stages of an operation and it may be necessary to compile an HPTL in several parts, e.g. close operations, deep operations, and by time blocks. The key to HPTs is that they are based on the friendly concept of operations.

The following is an example of a HPTL:

Event or Phase : Covering Force Battle			
PRIORITY (Note 1)	**CATEGORY (Note 2)**	**TARGET**	**REMARKS (Note 3)**
1	Fire Support	Multiple Rocket Launchers (MRL)	
2	Engineer	Bridging	
3	Command, Control and Communications (C3)	Motor Rifle Division HQ	
4	Air Defence	SA—15 Battery	

Table 3-1: High Pay-off Target List

NOTES

1. The assessment of target priority is based on the relative importance of destroying / neutralizing each type of target in order to achieve the mission.

2. There are 13 target categories as follows: C2; Fire Support; Manoeuvre; Air Defence; Engineer; NBC; ISTAR; IO; Petrol, Oil and Lubricants(POL); Ammunition; Maintenance; Transport ; and Lines of Communication.

3. This column can be used for any purpose, such as to provide available detail on the organization or structure of the target, ammunition restrictions, desired effects, etc.

c. **Step 3 - Establish Required Target Accuracy**.

(1) Having decided target priority, the next step is to decide when the target must be attacked and how accurately the target must be located in order to allow engagement by the available weapon systems. Target selection standards (TSS) assist in making these decisions. TSS are based upon the enemy activity under consideration and available attack systems by using the following criteria:

(a) attack system target location accuracy requirements;

(b) size of the enemy activity (point or area);

(c) status of the activity (stationary or moving); and

(d) timeliness of the information.

(2) Considering these factors, different selection standards may exist for a given enemy activity on the basis of different attack systems. For example, an enemy artillery battery may have a target location error (TLE) of 150 metres for attack by field artillery and a one-kilometre location error for engagement by attack helicopters.

(3) There are two categories of targets, as follows:

(a) **Targets.** Targets are those targets that have been located with sufficient accuracy to allow engagement. These targets must be within established TLE requirements for the selected attack system, take into account whether the enemy is stationary or moving, and be

timely enough to still be considered current.

(b) **Suspected Targets.** These are potential targets, which do not meet the timelines and/or established accuracy requirements, but merit continued examination for possible attack if improved targeting data can be obtained.

(4) The following is an example of a Target Selection Standards Matrix:

Event or Phase : Covering Force Battle			
HPT	**ATTACK SYSTEM**	**ACCURACY (TLE)**	**ACQUISITION TIME**
MRL Bty	MLRS/ATA CMS	< 1000 m	10 minutes
Bridging equipment	Attack helicopters	1000 m	2 hours
Motor Rifle Div HQ	GS Regt	200 m	1 hour
SA—15 launchers	GS Regt	200 m	15 minutes
Armoured reserve	MLRS	500 m	2 hours

Table 3-2: Target Selection Standards Matrix

NOTE

Acquisition time is the length of time from acquisition to attack that the target information is valid. It is based on the estimated time that the target is expected to remain in location.

d. **Step 4 - Provide Input Into the Intelligence Collection Plan.** Having established the general areas in which to focus ISTAR assets, the types of targets on which to

concentrate and the accuracy required, this information is then incorporated into the Intelligence Collection Plan. This plan is put into effect by means of the formation ISTAR Plan issued by the operations cell.

e. **Step 5 - Complete the Attack Guidance Matrix.**

(1) The key product in the targeting process is the Attack Guidance Matrix (AGM), as it ties together ISTAR and attack resources by identifying which HPTs are to be attacked, when, by what means and the desired effect on the target. On the basis of commander's guidance, the targeting team recommends how each target should be engaged in terms of the effects of fire and attack options to use. The effects of fire can generally be classified as destruction, neutralization and suppression.

(2) The Commander must then approve the attack guidance recommendations of the targeting team. This guidance should detail the following:

(a) a prioritized list of HPTs;

(b) when, how and the desired effects of attack;

(c) any special instructions; and

(d) HPTs that require BDA.

(3) The approved attack guidance is disseminated using the AGM. It provides commanders and their staff with guidance on the target priorities of the manoeuvre commander. It lists targets that must be located, what should be done when they are located, and who should take this action. The AGM is developed at the corps, division, brigade and, less formally, at battle group levels. The decision of what attack system to use is

made at the same time as the decision on when to acquire and attack the target. Coordination is required when deciding to attack with two different means, such as field artillery and air. Coordination requirements are recorded during the war-gaming process.

(4) As the operation progresses, the AGM may change. The AGM is a tool that must be updated on the basis of a changing enemy situation. It should be discussed and modified at routine staff planning meetings. AGMs could be prepared for different phases of an operation.

The following is an example of an Attack Guidance Matrix:

Event or Phase: Covering Force Battle							
TARGET DESCRIPTION	**SOURCE**	**ACCURACY**	**WHEN TO ATTACK**	**HOW TO ATTACK**	**EFFECT**	**POST ATTACK ASSESs**	**REMARKS**
Motor Rifle Division HQ	G2, EW	200 m	A	Air	N	UAV	Coord with EW
Independent Tank Bn	G2, EW	200 m	P	MLRS, Air, Avn	N		Coord with G3 before engaging
SCUD battery	G2	200 m	I	MLRS	D	UAV	
PMP Bridging Site	Div Recce Regt, G2	300 m	A	Fd Regt, Air	D		
2S6, SA9, SA13	DAIO, G2	500 m	P	GS Regt,	S		SEAD for aviation ops

Table 3-3: Attack Guidance Matrix

NOTES

Timing the attack of targets is critical to maximize the effects. During war-gaming, the optimum time is identified and reflected in the 'WHEN TO ATTACK' column. The meaning of each of the codes is as follows:

I = Immediate. This indicates the attack must be immediate and is a special case. This designation should be limited to a very small percentage of targets and only for the most crucial types. Too many immediate targets are disruptive and lower the efficiency of attack systems. Immediate attacks take precedence over all other missions, and are conducted even if it diverts fire from other attacks already underway.

A = Attack as assets become available. Targets are attacked as acquired and as soon as the required weapon system is available.

P = Planned. This indicates that the target should not be engaged at present. Instead, coordination and planning are done for its future firing. This is often the case when two or more attack systems are to engage the same target and the planning is completed to ensure that the maximum effect is felt on the target. It is also done to time the attack on the target with a manoeuvre force action.

The Effect on the Target is detailed as follows:
D—Destroy / **N**—Neutralize / **S**—Suppress

f. **Step 6—Establish Battle Damage Assessment Criteria.** Once a target has been attacked it may be essential to know how effective the attack has been. During the planning stage, criteria for BDA must be established. Provision must be made in the collection plan for this assessment to be carried out if considered sufficiently important.

DETECT FUNCTION

33. Detect is the next critical step in the targeting process. The G2 is the main figure in this step as he coordinates the effort to detect HPTs identified in the decide function. The DAIO and the BAIO assist their respective G2s. To ensure there is no duplication of effort, specific direction is given to target acquisition systems capable of detecting HPTs. Information needs are expressed as Priority Intelligence Requirements (PIRs) and Information Requirements (IRs). The detect function is carried out through the execution of the collection plan. The ISTAR plan is the means by which information-gathering assets are then tasked by the operations staff to execute the G2's collection plan.

34. The detection of targets is not confined to assets organic to the level concerned. The target acquisition (TA) assets throughout the fire support system feed information to the system as a whole. Higher levels may task lower TA assets for information, and lower levels may request information that only resources at a higher level can provide.

35. Key HPTs must be detected in a timely and accurate manner. Clear and concise taskings must be given to the TA systems that can detect a given target. Mobile HPTs must be detected and tracked to maintain a current target location. HPTs are assessed against the TSS to determine if they qualify as a target or as a suspected target. As the information is collected it is passed to the Targeting Officer for coordination of the attack. Detailed coordination among the intelligence staff and the FSCC is essential to ensure that targets are passed to the designated attack system in a timely manner so they can be engaged as outlined in the AGM.

36. The development of the collection plan, the acquisition of information, analysis and development of target information, and the dissemination of this target information are the responsibility of the G2. At

division level, this is effected through the Intelligence Collection and Analysis Centre (ICAC) and at brigade by the G2 himself or his small staff. Close cooperation with the FSCC is facilitated by placing a member of the artillery intelligence staff within the ICAC/G2 cell.

DELIVER FUNCTION

37. The deliver function of the targeting process executes the AGM and supports the commander's battle plan once the HPTs have been located and identified. During the detect function, it was the TA assets that had to be managed. The deliver function provides the framework for the efficient employment of firing assets. The attack of targets must satisfy the attack guidance developed during the decide function. The attack of targets requires a number of decisions and actions. The decisions can be described as a set of tactical and technical decisions.

38. **Tactical Decisions.** Tactical decisions include determining the time of attack, desired effects and selection of the appropriate attack system as follows:

a. **Time of Attack.** The time of attack for planned targets and targets of opportunity is determined as follows:

(1) **Planned Targets.** Planned target attack takes place only when the forecasted enemy activity occurs in the projected time or place. Once the enemy activity is detected, the targeting team does the following:

(a) The G2 verifies that the enemy activity is the planned target to be attacked. This is done by monitoring DPs and TAIs/NAIs associated with HPTs.

(b) The G2 validates the target by conducting a final check on the reliability of the source and the accuracy of the target location. He then passes the target to the targeting officer.

(c) The G3 staff monitors the legality of the target in terms of the ROE and LOAC.

(d) The targeting officer determines if the attack system(s) planned is available and still the best system for the attack.

(e) The targeting officer coordinates as required with higher/lower and flanking units, other services and allies with emphasis on identifying potential fratricide situations.

(f) The targeting officer issues the mission to the appropriate attack system.

(g) The targeting officer informs the G2 of target attack.

(h) The G3 staff alerts the appropriate system responsible for BDA (when applicable).

(2) **Targets of Opportunity.**

(a) HPTs of opportunity not on the HPTL are first evaluated to determine their validity and when or if they should be attacked. The decision is based on a number of factors such as the following:

i. the activity of the target;

ii. how long the target can be expected to remain in its current location; and

iii. the target payoff relative to the payoff of other targets currently being processed for engagement.

(b) If the decision is made to attack immediately, the target is processed. The availability and capabilities of attack systems to engage the target are assessed. If the target exceeds the capabilities of the commander's attack systems, or if the attack systems are not available, the target is nominated to higher headquarters for attack. If the decision is to defer the attack, the target continues to be tracked until a suitable DP for engagement is determined. If required, additional information is requested from the TA systems.

b. **Desired Effects.** The desired effects on the target must be determined. The desired effects on HPTs (destroy, neutralize, suppress) are determined in the decide function. The targeting team makes the determination for targets of opportunity. The bases for their decision are the payoff of the target and constraints on the availability of attack systems and munitions.

c. **Attack System.** The targeting team must check to ensure that the selected attack system, for both planned targets and targets of opportunity, is available and can conduct the attack. If use of the selected system is not feasible, the targeting team must select the most appropriate attack system available subject to the manoeuvre commander's guidance.

39. **Technical Decisions.** Once the tactical decisions have been made, the targeting officer provides the selected attack asset coordinator with the required time of the attack, the desired effects on the target and any special restraints or requests for particular munition types. The attack asset coordinator (e. g. G3 Air, G3 Aviation, multiple launch roket system (MLRS) fire direction centre) determines if his system can meet the requirement. If his system cannot meet the requirement (e.g. weapon system or required munitions not available at the specified time, out of range, etc.) he so notifies the targeting officer. The targeting officer must

then decide if the selected system should attack under different criteria or if a different system should be used.

ASSESS FUNCTION

40. Combat assessment is the determination of the effectiveness of force employment during military operations. It is composed of three elements as follows:

a. Battlefield Damage Assessment (BDA)—is the timely and accurate assessment of damage resulting from the application of military force, either lethal or non-lethal, against a target. It provides commanders with an estimate of the enemy's combat effectiveness, capabilities and intentions.

b. Munitions Effect Assessment (MEA)—this is used as the basis for recommendations for changes to increase the effectiveness of tactics, methodology, weapon system selection, munitions and weapon delivery patterns.

c. Recommendations for Re-attack—this aspect considers the requirement for another attack if the desired effect on the target has not been achieved.

41. BDA within the targeting process pertains to the results of attacks on targets listed on the AGM. Producing BDA is primarily an intelligence responsibility, but requires extensive coordination with operational elements to be effective. BDA accomplishes the following purposes:

a. At the tactical level, commanders use BDA to get a series of timely and accurate "snapshots" of attack effects on the enemy. It provides commanders an estimate of the enemy's combat effectiveness, capabilities, and intentions. This helps commanders determine whether their targeting effort is accomplishing their goals and objectives.

b. As part of the targeting process, BDA helps to determine if a re-attack is necessary. Commanders use this

information to allocate or re-direct attack systems to make the best use of available resources and combat power.

42. The requirement for BDA for specific HPTs is determined during the decide function in the targeting process. BDA requirements should be recorded on the AGM and the intelligence collection plan. Commanders and staff must appreciate that the resources required for BDA are the same resources used for TA. Therefore, the commander's decision must be made with the realization that an asset used for BDA may not be available for these activities. BDA information is received and processed by the ICAC/G2 to analyze the results of target attack in terms of desired effects. The results are disseminated to the targeting team. The targeting team must keep the following BDA principles in mind:

a. BDA must measure things that are important to commanders, not make important the things that are easily measurable.

b. BDA must be objective. When a G2 receives a BDA product from another echelon, he should verify the conclusions (time permitting). G2s at all echelons must strive to identify and mutually resolve discrepancies between the BDA analysis at different headquarters.

43. The degree of reliability and credibility of the assessment relies largely upon collection resources. The quantity and quality of collection assets significantly influence whether the assessment is highly reliable (concrete, quantifiable, and precise) or has low reliability (best guess). The best BDAs use more than one source to verify each conclusion.

44. BDA may take different forms besides the determination of the number of casualties or the amount of equipment destroyed. Other information of use to the targeting team includes the following:

a. whether the targets are moving or taking protective measures in response to the attack;

b. changes in deception efforts and techniques;

c. increased communication efforts as the result of jamming; and

d. whether the damage inflicted is affecting the enemy's combat effectiveness as expected.

45. BDA may be made passively through the compilation of information regarding a particular target or area. An example is the cessation of fire from an area. If active BDA is to be made, the targeting team must ensure that the intelligence acquisition systems receive adequate warning so the necessary sensor(s) can be directed at the target at the appropriate time. BDA results may change plans and earlier decisions. The targeting team must periodically update the decisions made during the decide function (the IPB products, the HPTL, the TSS, the AGM, the Intelligence Collection Plan and/or the operations plan). Based on the BDA and the analysis of munitions effects, the G2 and G3 consider the level to which operational objectives have been achieved and make recommendations to the commander. Re-attack and other recommendations should address operational objectives relative to the target, target critical elements, target systems, and enemy combat strengths.

46. The combination of BDA and MEA informs the commander of the effects against targets. On the basis of this information, the enemy's ability to wage and sustain war is continuously estimated.

CORPS AND DIVISION SYNCHRONIZATION

47. The focus at the corps level is on deep tactical and operational targets. These targets must be engaged to shape the battlefield for the close battle at division level and below. The corps deep assets must be integrated and synchronized with joint force systems. At the same time, the corps commander must support the detect and deliver requirements of subordinate formations and units. Corps and perhaps division HPTs are located throughout the depth of the battlefield. Corps and division commanders set the targeting priorities, timing and effects considerations with the higher commander's guidance. Mission analysis and plan development establish what conditions must be achieved for success. The planning process determines the combat activities, sequence of activities, and application of resources, including supporting services, that will achieve the conditions for success.

48. The corps ensures subordinate divisions and separate units understand the corps mission and concept of operations. Each division plan

supports the corps commander's intent and guidance. Corps deep operations establish the conditions for the divisions to successfully fight the corps commander's close operations. This understanding between corps and division means that each command supports the other. Missions and targets may be passed from corps to divisions as the more appropriate executor. The divisions may also have missions and targets that are beyond their capabilities that require corps to provide support. This mutual support must be coordinated and synchronized during the decide phase of the targeting process. Synchronization includes all of the following:

a. the coordination of the acquisition, tracking, and reporting of targets of concern at either or both levels;

b. the vertical exchange of target information;

c. the attack of targets outside the area of responsibility of a unit or formation - an example is the acquisition of a corps HPT by a division asset that is reported to corps and attacked by a corps asset;

d. the establishment of target engagement criteria;

e. the allocation of acquisition and attack resources; and

f. the establishment of communication links between sensor systems, decision makers, and attack systems.

49. The corps and division DOCCs and FSCCs and subordinate unit liaison officers, play key roles in this synchronization process.

SUMMARY

50. The targeting effort is continuous at all levels of command. Continuity is achieved through parallel planning by targeting teams from corps to battle group. Targeting must be exercised before the battle if it is to operate effectively. It is closely intertwined with IPB and the operation planning process.

51. The targeting team has three primary functions in assisting the commander:

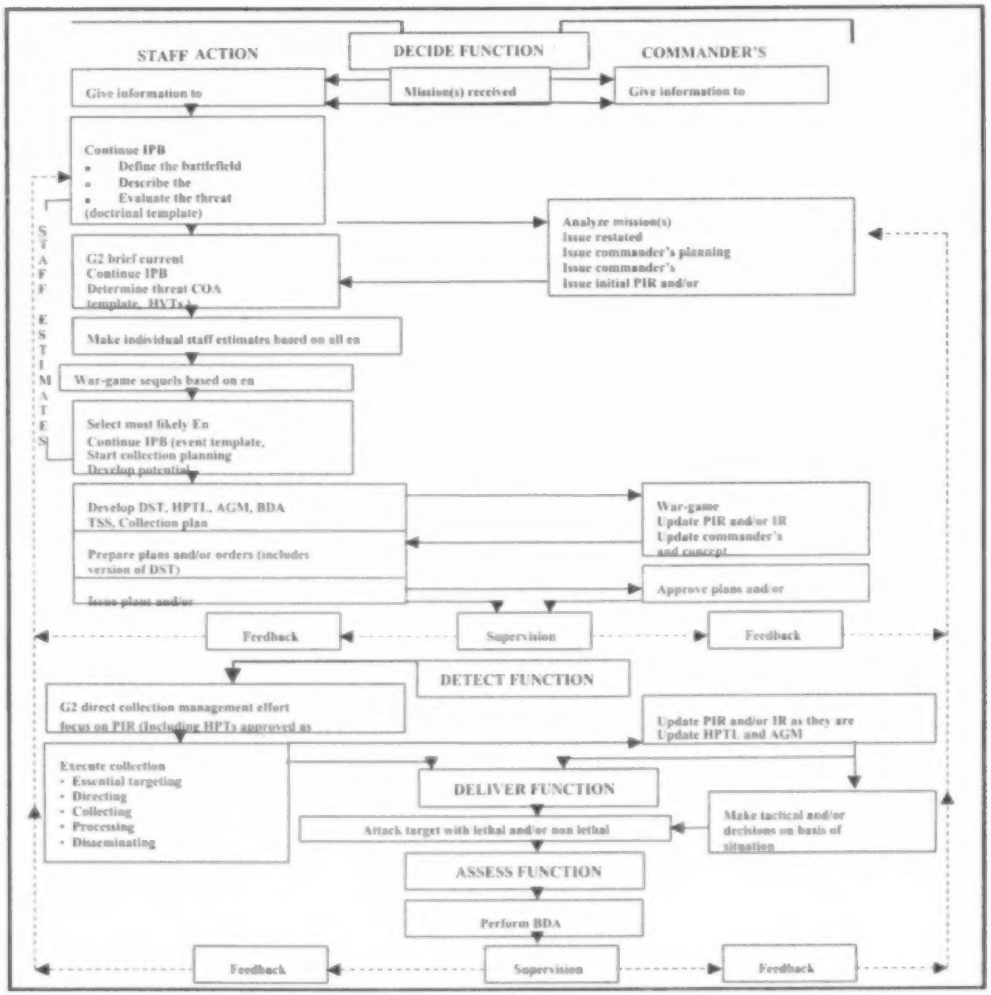
a. helping to synchronize operations;

b. recommending targets to acquire and attack. The team also recommends the most appropriate and available assets with which to acquire these targets; and

c. identifying combat assessment requirements. Combat assessment can provide crucial and timely battlefield information to allow analysis of the success of the plan or to initiate revision of the plan.

52. The modern battlefield presents many targets of different types and vulnerabilities, exceeding the number of resources available to acquire and attack them. The Commander must determine which targets are most important to the enemy and, of those targets, which ones he must acquire and attack to accomplish his mission. The purpose of targeting is to assist the Commander in making these decisions.

ANNEX A
THE TARGETING PROCESS



CHAPTER 4
AIR DEFENCE

INTRODUCTION

1. The air battle is an integral part of the joint battle. This chapter provides the doctrinal foundations for Land Force Air Defence (AD) operations in joint and combined operations. AD artillery (AD arty) is the term for the Land Force's contribution to joint counter-air operations. AD includes offensive and defensive actions to counter the air threat.

2. The airspace of a theatre is as critical a dimension of joint operations as is the terrain itself. Airspace is used for critical purposes including manoeuvre, indirect fire support, reconnaissance and surveillance, transportation, and battle command. Effective control and coordination of airspace will have a significant impact on the outcome of campaigns and battles. Joint commanders must consider airspace and the apportionment of air power in planning and supporting their operations. Commanders must expect the enemy to contest their use of the airspace and must protect friendly forces from enemy observation and attack. AD operations contribute to gaining and maintaining the desired degree of air superiority and force protection, and contribute to information operations by the use of AD surveillance systems (optical, electronic etc).

3. The role of the AD arty is to prevent the enemy from interfering from the air with land operations. This role encompasses both active and passive measures. AD arty contributes to the overall counter-air campaign through the destruction of the enemy's air assets, which include fixed wing aircraft, helicopters, missiles or unmanned aerial vehicles (UAVs).

4. AD is conducted in reaction to actual or potential enemy offensive air activities. Commanders conduct operations to attain and maintain a desired degree of air superiority by the destruction or neutralization of enemy air assets. The ultimate goal of counter-air operations is to control the airspace to allow commanders the freedom to execute their plans. Both offensive and defensive actions are involved. Offensive counter-air operations range throughout the battlefield and are generally conducted at the initiative of friendly forces. Defensive counter-air operations are generally reactive against enemy air activity. Passive measures are taken to minimize the effects of hostile air actions.

METHODS OF AD DEPLOYMENT

5. Various methods for the organization of AD resources are available to provide effective AD for the joint force. These include the following:

a. **Area Defence.** Area defence is a posture designed for the defence of a broad area. Joint air forces provide area defence for the theatre of war. AD of the theatre is provided by a combination of AD arty and airforce assets. Long range AD, e.g. Patriot, provides AD area air and missile defence at high level for the theatre. Short Range Air Defence (SHORAD) assets provide low level AD coverage particularly for manoeuvre forces.

b. **Point Defence.** Point defence is a posture designed for the protection of a limited area, normally in defence of the vital elements of a force or of vital installations. Normally AD arty resources are employed in point defence. Very Short Range Air Defence (VSHORAD) units are integrated into the manoeuvre force to provide protection according to the manoeuvre commander's scheme of manoeuvre and AD priorities.

c. **All Arms AD (AAAD).** AAAD is a posture developed by all friendly units to defend themselves against direct attack or threat of attack through the use of organic weapons and electronic warfare. AAAD policies are established by the Area AD Commander (AADC).

d. **Maritime AD.** Maritime AD is primarily defensive encompassing the principles outlined above. Maritime AD, also termed anti-air warfare, is conducted simultaneously with other naval warfare tasks. Maritime AD requires the establishment of mutually supporting defensive positions to progressively absorb and weaken enemy attacks. Maritime air assets can provide support to land forces during amphibious operations.

6. Dedicated AD assets may be provided by all components of the joint force. Resources of the active AD system may include weapon

systems and command and control systems as well as additional contributing systems as follows:

a. **Weapon Systems.** All systems have limitations such as reaction time, range, identification capability and flexibility of operation. However, vulnerability or disadvantages of one type of system are often offset or mitigated by the capabilities of another type of system. Therefore, an effective active AD requires a mix of weapon types and systems. This balance is required not only between aircraft and surface-to-air weapons but also among the specific types of aircraft, missiles and guns.

b. **Command and Control Systems.**

(1) All AD operations are integrated through weapons control procedures, coordination with adjacent AD units, coordination between service components and through shared awareness of the enemy and friendly situation. Service components exercise both positive and procedural control of their assigned AD forces. An integrated AD requires the provision and exchange of essential real-time information. This information must include AD warnings that allow commanders to implement the appropriate active and passive AD measures. Successful AD operations depend upon the ability to process multiple target data and to exchange this information between sensors and weapon systems. This requires a sophisticated data processing capacity and secure communications assets. When secure communications are not operational, enemy air target information from airborne and ground-based sensors may be passed by non-secure data or voice broadcast. In addition, the command and control system should be survivable and have redundancy.

(2) AD sensors are normally optimized to perform specific surveillance or control functions. To

provide the spectrum of coverage required for AD operations, a number of complementary systems are necessary. These range from a mix of static and mobile equipment to strategic warning systems. These systems are linked to enable the gathering and dissemination of information to all AD forces under all operational conditions. The command and control system may include:

(a) **Airborne Early Warning.** Airborne sensors serve to overcome range and low-level detection limitations inherent in a surface-based sensor system and are integrated with surface systems. The use of airborne early warning systems will extend detection ranges and consequently increase the time available for reaction. At the same time, friendly positions will not be compromised and the threats from low-level surprise attacks will be significantly reduced. Use of other sensors to provide early warning can permit ground based AD weapon systems to remain passive thus reducing their vulnerability to enemy targeting.

(b) **Space-based Early Warning.** Space platforms provide warning of ballistic missile attack and other intelligence information to either national or theatre warning systems. Space-based systems can provide longer-range warning than airborne or surface-based sensors.

(c) **Ground-based Surveillance Systems.** This category includes a range of capabilities from sound detection systems to manned observation posts.

(d) **Civilian and Military Air Traffic Control Facilities.** Air traffic control facilities in the area of operation may contribute vital information to AD forces. These capabilities are exploited and, where possible, netted into the command and control system.

(e) **Low Level Radar and Surveillance Systems.** This may include mobile radar systems and electro-optical equipment which when their information is netted combine to produce a low-level air picture.

(f) **Intelligence Resources.** These may provide indications of imminent hostile activity, potential early warning and positive hostile identification before detection by the AD system. The maximum possible use of this information is essential. Clandestine sources may augment this information.

AD AND THE COMBAT FUNCTIONS

7. AD operations span two of the combat functions. Within Canadian doctrine, AD is part of the protection function, as its primary role is to protect the force from air attack. AD can be positioned and employed with the aim of attacking and destroying enemy air vehicles, rather than defending specific assets, and is therefore also a component of the firepower function. AD also contributes to information operations by providing integrated air situation awareness. Further details of how the combat functions are integrated can be found in B-GL-300-002/FP-000, *Land Force Tactical Doctrine*.

COUNTER-AIR OPERATIONS

8. The AD commander (ADC) and staff must consider the broad spectrum of potential air and missile threats to successfully protect the force and designated assets. Allied or coalition air forces can be expected to protect forces from the majority of the fixed-wing aircraft threat. However, there are a variety of other air and missile systems which can perform a wide range of missions against a joint force as follows:

a. helicopters;

b. UAVs;

c. cruise missiles;

d. tactical air to surface missiles; and

e. ballistic missiles.

9. Counter-air operations are combat operations directed against the enemy's air offensive and defensive capability in order to attain and maintain a desired degree of air superiority (AAP-6). Air superiority, at the crucial time and place, provides friendly forces with a more favourable environment in which to dominate air, land and sea operations. Achieving friendly control of the air prevents the enemy from using air power effectively against friendly forces and rear areas, while allowing friendly use of air power against the enemy. Limiting the enemy's use of his air power increases our potential for success. Since offensive and defensive operations must often rely on the same airspace and resources, they cannot be considered in isolation from each other. The emphasis on either offensive or defensive counter-air operations will depend on the overall situation and the joint force commander's concept of operations. Counter-air operations are by nature joint and affect air, land, and maritime battles, often crossing the boundaries between them.

10. Control of the air is achieved by deterring, containing or defeating the enemy forces. The three basic degrees of control of the air are defined as follows:

a. **Favourable Air Situation.** A situation in which the extent of the air effort applied by the enemy air forces is

insufficient to prejudice the success of friendly land, sea or air operations.

b. **Air Superiority.** That degree of dominance in the air battle of one force over the other which permits the conduct of operations by the former and its related sea, land and air forces at a given time and place without prohibitive interference by the opposing force (AAP-6).

c. **Air Supremacy.** That degree of air superiority wherein the opposing air force is incapable of effective interference with friendly op ons.

11. Counter-air operations are divided into two categories as follows:

a. **Offensive Counter-Air Operations.** Operations mounted to destroy, disrupt of limit enemy air power as close to its source as possible.

b. **Defensive Counter-air Operations.** Operations designed to nullify or reduce the effectiveness of hostile air action.

OFFENSIVE COUNTER-AIR OPERATIONS

12. To prosecute offensive counter-air operations the following roles are employed:

a. **Airfield Attack.** The attack of enemy airfields to destroy and disrupt his air operations.

b. **Fighter Sweep.** This is an offensive mission by fighter aircrafts to seek out and destroy enemy aircraft or targets of opportunity in an allocated area of operations (AAP-6).

c. **Suppression of Enemy Air Defences (SEAD).** That activity which destroys, neutralizes or temporarily degrades enemy air defence systems in a specific area by physical attack and/or electronic warfare to enable air operations to be conducted successfully (AAP-6).

DEFENSIVE COUNTER-AIR OPERATIONS

13. Defensive counter-air operations involve both active and passive measures, which rely for their effectiveness on detection and command and control systems. The components of Defensive counter-air are depicted in the following figure:

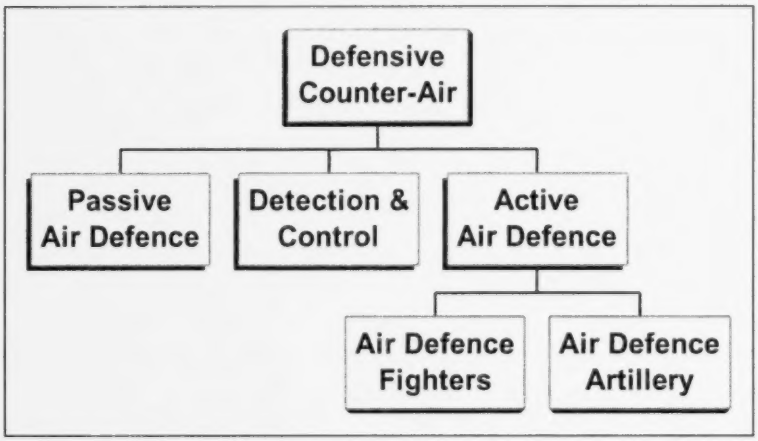


Figure 4-1: Defensive Counter-Air Operations

14. The components of Defensive counter-air operations are described below:

a. **Passive AD.** Passive measures improve survivability by reducing the likelihood of being detected and targeted from the air and by mitigating the potential effects of air surveillance and attack. It does not involve the employment of weapons. Passive AD measures by all members of the joint force are essential to force protection. Depending on the situation and time available in the area of operations, a variety of actions can be taken to improve the joint force's passive AD posture of the joint force. These actions include:

(1) hardening of assets, including protection against electromagnetic pulse and transient radiation early effects;

(2) providing a capability for rapid battle damage repair;

(3) providing nuclear, biological and chemical defence equipment and facilities;

(4) providing sufficient assets to allow redundancy of systems and facilities;

(5) providing alert, warning and all-clear systems;

(6) adopting a comprehensive electromagnetic emission control policy (including infra-red and optical);

(7) netting available communications and air, land and sea-based sensor systems;

(8) providing camouflage, concealment, cover, dispersal and deception;

(9) repositioning electromagnetic emitters to prevent targeting;

(10) providing operations and communications security; and

(11) using limited visibility or hours of darkness for movement, resupply and supporting operations.

b. **Detection/Control Systems.**

(1) **Detection.** A detection system is required to provide adequate warning of the approach of hostile aircraft and for alerting forces involved in defensive counter-air operations. The system will include fixed and mobile ground based sensor systems and may include airborne early warning aircraft to augment static coverage.

(2) **Control.** An AD command and control system is required to link all AD system components and to provide the means to alert and control the AD weapon systems. The system must provide complete coverage of the air space to be defended and may include airborne warning and airborne command and control aircraft.

c. **Active AD.** The critical components of active air defence are the weapon systems. Effective Active AD operations must detect, acquire, recognize and identify a target, intercept it and destroy or neutralize it before its weapons are released. These operations will include an integrated mix of fighter aircraft as well as surface-to-air weapons systems as follows:

(1) **AD Fighter Aircraft.** Fighters may fly three basic missions. These missions are explained as follows:

(a) **Interception.** Intercept missions may involve the scramble of aircraft from a high state of readiness or the direction of aircraft from combat air patrols. Interceptions can be carried out autonomously by fighters, but more usually are made with the assistance of airborne AD radars and control systems.

(b) **Combat Air Patrol.** These missions are mounted over an objective area, over the force to be protected, over the critical area of a combat zone or over an air defence area for the purpose of intercepting and destroying hostile aircraft before they reach their targets.

(c) **Escort.** Escort missions involve the assignment of aircraft to protect other aircraft during a mission.

(2) **AD Artillery.** AD arty weapons systems are employed primarily to protect the land force. These weapons potentially offer large amounts of firepower and instant responsiveness to the assets defended. For maximum effect, a mix of types of surface-to-air weapons should be employed as the optimal capabilities of each weapon system occur at different ranges and altitudes. This then provides an integrated AD environment. Surface-to-air systems provide the best overall defence when their operations are both integrated and coordinated with air asset tasks. Integration and coordination ensures the minimum-risk passage for friendly aircraft and the means to harmonize the employment of surface-to-air weapons and fighter aircraft. Effective airspace control is the key to the attainment of this objective.

FUNDAMENTALS OF AD

15. To effectively win the counter-air battle, certain fundamentals of AD must be followed:

a. AD assets of all services must be integrated. AD must be coordinated with operations on, and over land and sea.

b. AD forces must be equipped and trained to operate in an electronic warfare environment.

c. The level of operational readiness must be defined to enable AD elements to provide effective force protection.

d. Coordination within and between AD regions must be accomplished to ensure a unified response to any threat and to ensure the most effective use of AD resources.

e. Active and passive AD must be considered complementary parts of an overall AD capability.

INTEGRATION AND COORDINATION

16. The manoeuvrist approach to warfare requires the closest possible integration of AD systems into the joint and combined arms battle. It is also essential that the overall joint AD design for battle integrate the coverage of the various weapon systems available into a layered structure. This will ensure that enemy airborne threats have to penetrate successive layers to reach their intended targets. Layers must also overlap in range and height to allow more than one system to engage the enemy and thus complicate the countermeasures required. Overlapping is also required to reduce the likelihood of gaps in coverage caused by terrain, the attrition of weapon systems and saturation raids. This is achieved by a mix of aircraft and both static and mobile ground based AD systems. Ground based systems fall into three categories: High/Medium AD (HIMAD) Short-Range AD (SHORAD) and Very Short Range AD (VSHORAD). From the perspective of joint layered defence, Army systems provide limited area defence and point defence. The necessary coordination between systems is provided by operations centres, which aim to achieve a sufficient degree of airspace control to enable friendly aircraft to perform their operations in safety, while AD systems are given as much freedom as possible to engage air threats. The following is an illustration of layered AD:

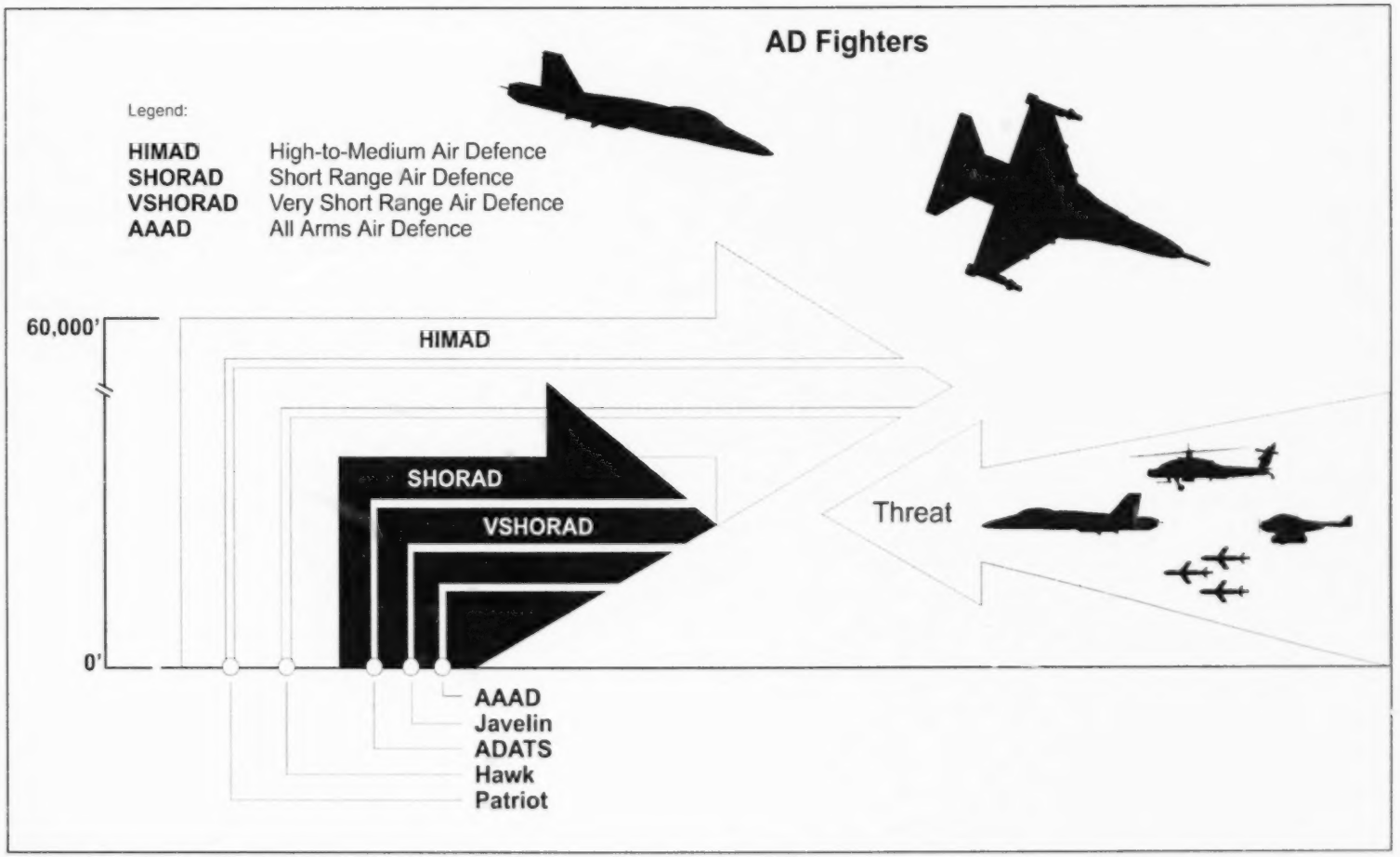


Figure 4-2: Layered Air Defence

AD ARTILLERY PRINCIPLES OF EMPLOYMENT

17. The principles governing the employment of AD arty weapon systems are as follows:

a. **Concentration of Force.** It will usually prove impossible to provide effective AD protection for as many of his assets as a formation commander might wish. It is therefore essential that the commander, in consultation with the AD arty commander, establish clear priorities for AD. Weapon systems should then be concentrated onto the highest priority tasks. This decision implies a reduction in protection in other parts of the battlefield. The implied risks to these may have to be accepted and greater reliance placed on passive AD measures.

b. **Mutual Support.** AD arty is most effective when mutual support is achieved between weapons. This allows the maximum weight of fire to be brought to bear on multiple air targets and reduces the ability of the enemy to eliminate individual weapon sites.

c. **All Round Defence.** The flexibility of air power enables attacks to be mounted from any direction. Notwithstanding the principle of concentration of force, all round defence must be achieved whenever possible. This principle is of particular importance for the defence of vital points.

d. **Cooperation.** In view of the joint and combined nature of AD operations, cooperation is essential to the success of any AD plan. Cooperation will also enable the best balance to be struck between using air power for air defence or for striking the enemy. Cooperation also applies in the sense that AD is integral to the joint battle; no operational or tactical task ought to be planned without a full consideration of the enemy air threat. At the lowest level, cooperation on the ground with other troops is required in the detailed siting of AD weapons and for local defence against enemy ground troops.

18. Integrated employment of air-to-air and surface-to-air systems through coordinated detection, identification, assessment, and engagement is necessary to prevent enemy surveillance and attack. Airspace control in an active AD environment is crucial to successful friendly air operations and effective AD. Procedural and positive control measures may be implemented to ensure that our air assets can safely transit friendly airspace without inhibiting AD or other friendly operations. These measures are defined as follows:

a. **Procedural Control.** A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures (AAP-6). Procedural control includes techniques such as the segmenting of airspace by volume and time, and/or the use of weapon control orders. This method is more restrictive than positive control but it is less vulnerable to interference by electronic or physical attack.

b. **Positive Control.** A method of airspace control, currently under active development, which relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein. Positive control relies upon real time data using facilities equipped with capabilities such as radar, IFF and communications.

AD COMMAND ORGANIZATIONS

19. AD arty command facilities are known as AD cells (ADC) and command posts.

a. **AD Cells.** ADCs are established at joint force (JFADC), corps (CADC), division (DADC) and, if AD resources are assigned, at brigade (BADC) headquarters. The ADC is the location where the AD commander, and his staff, perform their duties and provide advice on the employment of AD assets. The ADC performs the AD planning and airspace coordination functions and

combines with air and aviation representatives to form an Airspace Coordination Cell (ASCC).

b. **Command Posts.** A tactical command post is established by units or sub-units to perform the AD command function.

COMMAND

20. Command of AD arty will not normally be decentralized. AD arty will normally carry out tactical tasks assigned by the higher AD commander, except where the supported force is separated from the formation to which it belongs (e.g. brigade assigned a task away from its parent division). In these cases, command relationships will be used. These situations may also include joint and/or combined operations, such as airmobile operations, airfield or port defence or amphibious operations.

21. Close liaison with air and aviation cells is achieved through the ADCs at the various levels. Close coordination of air and AD operations must take place which involves implementation of the airspace control plan (ACP), as appropriate, and liaison with the formation air and aviation staffs as well as the G3. The ACP is promulgated daily in the Airspace Control Order (ACO).

22. AD units will be deployed across the entire battlefield and situations will occur where they will be deployed in the area of a unit with which no command relationship exists. In these circumstances, liaison will have to take place between AD units and other battlefield users.

AD WARNINGS

23. AD warnings (ADWs) represent the commander's evaluation of the probability of air or missile attack within the area of operations (AO). ADWs are routinely issued by area or region AD commanders. They can also be issued by any commander. In no case, however, can the local ADW be lower than the overall ADW issued by the AD area or region commander. The issuance of an ADW is not tied to any other warning procedure or alert status but can influence the AD arty commander's decisions to adopt a higher or lower state of readiness. The accuracy and

reliability of these warnings are dependent on the early warning assets and communication systems in place. These warnings are applicable to all units in the AO and are intended to invoke preparations by the force and should therefore be distributed as widely and as quickly as possible. The three ADWs are:

a. **ADW Red.** Attack by hostile aircraft or missiles is imminent or in progress. This means that hostile aircraft or missiles are within a respective AO, or are in the immediate vicinity of a respective AO with high probability of entry into the AO.

b. **ADW Yellow.** Attack by hostile aircraft or missiles is probable. This means that hostile aircraft or missiles are en route toward a respective AO, or unknown aircraft or missiles suspected to be hostile are en route towards, or are within, a respective AO.

c. **ADW White.** Attack by hostile aircraft or missile is improbable. ADW White can be declared either before or after ADW Yellow or ADW Red.

WEAPON CONTROL ORDERS

24. Weapon control orders (WCO), WEAPONS FREE, WEAPONS TIGHT, or WEAPONS HOLD, describe the relative degree of fire control of AD weapons. The corresponding weapon control statuses (WCS) apply to weapon systems, volumes of airspace or types of air platforms. The degree or extent of control varies depending on the tactical situation. Establishment of separate WCS for fixed and rotary-wing aircraft and for UAVs is normal e.g. "WEAPONS TIGHT Helicopters", "WEAPONS FREE Fixed Wing". AD forces must have the ability to receive and disseminate WCS for all classes of air platforms. The Area AD Commander normally delegates the authority for establishing rotary wing WCS to the appropriate manoeuvre force commander. He may also delegate WCS for UAVs to the manoeuvre commander. The manoeuvre force commander may further delegate the authority to subordinate commanders, based on the tactical situation or operation. Commanders who do not have authority to establish WCS still may direct more restrictive WCS in their AO. The WCOs are defined as follows.

a. **WEAPONS FREE.** Weapons can fire at any air target not positively identified as friendly. This is the least restrictive WCO.

b. **WEAPONS TIGHT.** Fire only at air targets positively identified as hostile according to the prevailing hostile act criteria. Hostile act criteria are basic rules that assist in the identification of friendly or hostile air platforms. These rules are promulgated by joint force commanders and by other appropriate commanders when so authorized. Positive identification can be effected by a number of means to include visual indentification (aided or unaided) and meeting other designated hostile act criteria supported by track correlation.

c. **WEAPONS HOLD.** Do not fire except in self-defence or in response to a formal order. This is the most restrictive WCO. It is also the usual WCO for AAAD.

AIRSPACE CONTROL

25. The following descriptions of the responsibilities of those involved are important in understanding airspace control:

a. The Joint Force Commander (JFC) will appoint a Joint Force Air Component Commander (JFACC). His responsibilities normally will include planning, coordinating, allocating and tasking based on the JFC's concept of operations.

b. The JFC also designates the Airspace Control Authority (ACA). His responsibilities include coordinating and integrating the use of the airspace control area. Subject to the authority and approval of the JFC, the ACA develops broad policies and procedures for airspace control.

c. The JFC will normally appoint an Area AD Commander (AADC). The successful conduct of air defence operations requires the integrated operation of all available air defence systems for all services. Air defence

operations must be coordinated with other operations both on land and over the sea. This function is carried out by the AADC.

26. Because of the integrated relationship between airspace control measures and air defence operations, ACA and AADC duties should be carried out by the same person, who may also be the JFACC. During Operation DESERT STORM, all three responsibilities were carried out by the Air Force Commander.

AIRSPACE CONTROL SYSTEM

27. The Airspace Control System (ACS) is the means by which the JFACC or the AADC directs the airspace control functions of the land force. The system consists of a network of ASCCs at all levels that are linked by communications and/or procedures to form a cohesive ACS. These ASCCs consist of air, aviation and AD arty representatives. The AD arty component is represented by the AD cell at all levels of the land force (e.g. DADC).

28. An Airspace Coordination Centre performs the following functions and tasks within its defined area of responsibility:

a. coordination of AD, tactical air support, surface fire, and air traffic information;

b. coordination, assembly and promulgation of relevant airspace activity data (e.g. low level transit routes);

c. provision of advise to the local commanders of possible conflicts between friendly users and of the airspace, and in light of the tactical situation, the prioritization of airspace use;

d. implementation of positive and/or procedural control measures to minimize the risk of fratricide to users of the airspace and informing users of the measures imposed. This information will normally be derived from the ACO;

e. liaison with adjoining command facilities/cells to ensure mutual awareness of airspace activity; and

f. the obtaining of guidance from higher authority when unable to resolve conflicting priorities. Conflicts, which cannot be resolved to the satisfaction of all parties, will normally result in giving the right of way to the air force assets.

SUMMARY

29. AD arty is an important component of defensive counter-air operations. It increases the manoeuvre commander's freedom of movement by decreasing the enemy's ability to interfere with ground operations through air power. Full integration of all AD systems is vital in ensuring the maximum effectiveness of defensive counter-air operations.

30. The following principles must be applied when employing AD arty systems.

a. concentration of force;

b. mutual support;

c. all round defence; and

d. cooperation.

31. AD can either be active or passive. Active AD consists of actions to destroy enemy air vehicles. Passive AD consists of taking measures to decrease friendly forces' vulnerability to air attack. AD arty can be deployed in an attritional posture or a defensive posture. Attritional AD places the emphasis on destroying enemy aircraft, whereas defensive AD concentrates on protecting friendly assets.

32. Additional detail on the subject of AD may be found in B-GL-372-001/FP-001, *AD Artillery Doctrine*.

CHAPTER 5
NON-LETHAL WEAPONS

... As the horns blew, the people began to shout. When they heard the signal horn, they raised a tremendous shout. The wall collapsed, and the people stormed the city in a frontal attack and took it...

(The Fall of Jericho, Joshua, Chapter 6 - A biblical reference to an early form of acoustic combat)

INTRODUCTION

1. Non-lethal Weapons (NLW) have been employed by military forces on numerous occasions during the latter half of the 20th century. During the Vietnam War, American forces used tear gas to flush enemy troops out of tunnels and dropped slippery substances on the Ho Chi Minh trail in an unsuccessful attempt to impede the flow of supplies out of North Vietnam. As technology advances and post-Cold War requirements evolve, new NLW and agents are becoming available that give commanders an increasing number of options, other than deadly force, with which to achieve their objectives.

2. NLW are defined as those weapons, munitions and devices that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel and undesired damage to property and the environment. This definition does not include information operations (e.g. jamming, psychological operations, etc.) or any other military capability not designed specifically for the purpose of minimizing fatalities, permanent injury to personnel, and undesired damage to the environment, even though these capabilities may have non-lethal effects (e.g. smoke and illumination)

3. NLW are becoming increasingly relevant for application across the spectrum of conflict and are being developed and acquired by many countries. NLW can facilitate manoeuvre and augment and intensify the synergistic effects of conventional weapons. Many NLW use off-the-shelf technology so their use by or proliferation to enemy forces must be expected necessitating the need for counter-measures. It is therefore

important that a clear understanding of NLW capabilities and principles of employment be articulated for Canada's Army.

4. Two basic tenets of NLW are as follows:

a. NLW are neither designed nor destined to be a replacement for lethal (conventional) armaments. Rather, they have the potential to augment existing and future military capabilities and thus provide a continuum of force/response options. NLW are most effective in situations where the use of lethal means would be considered excessive or collateral damage would be unacceptable.

b. NLW are designed with the intent to disrupt, disable or otherwise degrade the normal functioning of personnel and materiel. While in principle it is not difficult to design a non-lethal weapon, it becomes extremely difficult, if not impossible, to ensure in practice that it will be non-lethal in all cases.

TYPES OF NON-LETHAL WEAPONS

5. The main categories of NLW are outlined below. The list is not all-inclusive, but provides a summary of some of the major NLW technologies available or under development.

a. **Electromagnetic.** This group includes the following technologies:

(1) **Lasers.** Highly focused laser light sources, with very wide power ranges emitting in the visible part of the spectrum, can be used to dazzle or flash blind a person for periods of seconds to several minutes. Another type of laser, the pulsed chemical laser, generates a very high power pulse of energy, which produces a shock wave in the target.

(2) **Optical Munitions.** Typical optical munitions produce bright flashes of light that have the effect of dazzling or temporarily flash blinding a person and causing disorientation. The effect can be generated by an explosive burst that superheats gaseous plasma surrounding the explosive device producing an extremely bright flash. Another typical example is a combination of magnesium or aluminium powder and an oxidiser, which can produce a brilliant omni-directional light pulse. This technology can be adapted to explosive devices like grenades and artillery and mortar projectiles. Further disorientation and shock can result if these munitions are combined with acoustic effects (e.g. the simulation of exploding shells and grenades).

(3) **Microwaves.** Microwaves are electromagnetic wavelengths that bridge the frequency gap between normal radio waves and heat waves. In their weapons form, high-powered microwaves operate by converting energy released from a conventional explosive into non-nuclear electromagnetic pulse (EMP). If electronic devices, such as vehicle ignitions, communications equipment, computers, etc., are exposed to microwaves of high intensity, the waves couple into the electric network leading to the destruction of components by inducing high currents. Conventional protection against nuclear EMP can be ineffective against high-powered microwaves (HPM), especially in the case of very high power and/or sophistication. The effects of HPM, of varying intensity, on humans are largely unknown.

(4) **Conductive Materials.** This technology consists of conductive fibre ribbons which when dropped in great quantities above electric stations (high-voltage stations, transformer

stations, etc) cause electric short circuits and the resulting disablement of the facility. A danger of lethal effects exists for persons in the area when a ribbon causes an electrical arc (e.g. between a high voltage wire and the ground, with a person in between or close to it).

b. **Acoustic.** Sound waves, both audible and inaudible, can influence internal organs as well as the human ear. Below the level of pain and damage (120-130 decibels) noises, such as screeching and banging, can be unbearable and can lead to uncontrolled psychological and physical reactions. Raising the intensity can cause permanent damage to unprotected ears. Extreme frequencies can have different effects. Infrasound [1] at certain decibel levels can cause reversible effects like distortion of balance and vision, dizziness, disturbance of body organs and nausea. Shock waves produced by some acoustic devices can cause effects similar to being hit by a blunt object. Other effects, according to intensity levels, can vary from discomfort to permanent injury or death.

c. **Chemical and Pharmacological.** This category of NLW is one of the most extensive with some of the more common applications, such as riot control agents (e.g. CS and CN gas and pepper spray), in widespread use by civilian police forces. Chemical agents are, however very closely linked to aspects of chemical warfare and, as such, their use for military purposes is largely restricted by the Chemical Weapons Convention (CWC). Pharmacological agents, such as calmative and mind altering substances, with the objective of altering human behaviour, would likely be restricted by the CWC as well. Other types of chemical agents are designed primarily to attack materiel

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[1] Human hearing covers the frequencies between approximately 20 to 20,000 hertz. Frequencies above this range are called ultra-sonic (ultrasound) and those below, infrasonic (infrasound). A hertz (Hz) is a unit for measuring the frequency or rate of occurrence, of sound waves and vibrations, equal to one cycle per second, or the number of sound waves a vibrating object gives off per second.

or deny mobility to vehicles and/or personnel. This technology includes, but is not limited to, the following:

(1) Super-corrosives and super-caustics—corrosive or caustic chemical processes, induced by strong acids that are able to destroy the crystalline structure of metals and to attack glass and ceramics. For example, a mixture of hydrochloric and nitric acids can dissolve metals and organic compounds such as plastics, rubbers, polymers and glass. Such chemicals would be very hazardous to humans without protective clothing.

(2) Fuel/combustion modifiers—chemical substances which are added to fuel in order to change its properties and thereby put the engine out of action. Possible additives include those that create polymer chains to increase viscosity (formation of gels or gelling of the fuel) which clog up fuel pumps, fuel pipes or carburetors.

(3) Liquid metal embrittlement (LME)—chemicals that reduce the strength of materials to cause them to fail or fracture under stress or to eventually disintegrate. Depending on the agent and the target material the reaction time can extend over hours, days and even years. Most of these chemical mixtures are highly toxic.

(4) Anti-traction agents—chemicals, such as oils, special polymers or teflon -based substances, that cause surfaces to become very slippery thereby reducing traction. Non-toxic agents are available and permanent injuries would be unlikely except for those caused by accidents.

(5) Super-adhesives, foams and binding coatings—chemicals that rapidly adhere to the target with great strength. There are several variations on this concept as follows:

(a) a polymer based super-adhesive coating, in liquid form, can be projected at an individual; this liquid quickly gels to form a thick coating or foam, which is hard to tear and significantly hampers freedom of movement. The risk of injuries or death can not be excluded, especially if the individual is hit in the face. Foams can also be used as an interior barrier system to fill a passageway or compartment to deny access, and

(b) other types of super-adhesive agents can rapidly and firmly adhere to surfaces. Potential applications include binding the moving parts of equipment and weapon systems thereby rendering them useless and gluing shut doors and hatches.

d. **Biological/Bacteriological.** Biodegrading microbes can produced acids and enzymes, which may be tailored to degrade a wide range of materiel including weapons, and ammunition and equipment. Examples include organisms that cause biodeterioration in items such as explosives, rubber parts, fuel and electrical components. While the potential for NLW application is extensive, the employment of biological agents is also an extremely sensitive political and legal issue with their use limited by the Biological Weapons Convention.

e. **Kinetic.** This category includes non-penetrating projectiles, which have been used by law enforcement organizations and some military forces for many years. The purpose of these projectiles is to cause pain or to knock over a person with a non-lethal bullet (e.g. rubber or plastic bullet/ball, baton round, bean bag, etc.) fired from a hand held projector or other device. Containment systems delivered by a projection device, such as wire entanglers and mechanically activate barriers designed to

immobilize both personnel and vehicles, are also included in this category.

NLW CAPABILITIES

6. The core capabilities associated with NLW fall into two major classes: anti-personnel and anti-materiel. The capabilities of each are as follows:

a. **Anti-personnel.** The aim of NLW designed for use against personnel is to incapacitate people or control their activities in accordance with the mission objectives while minimizing fatalities or serious casualties. Anti-personnel capabilities can be further described as follows:

(1) the capability to deny personnel access to a specific area. This may include the emplacement of physical barriers or systems that cause discomfort to individuals entering restricted zones,

(2) the capability to clear personnel from facilities and structures,

(3) the capability to incapacitate people to prevent them from carrying out an undesirable activity or as a means to capture specific individuals, such as enemy combatants we wish to take prisoner. In keeping with the basic principle of non-lethality, the means used to cause incapacitation should be readily reversible, preferably self-reversing through the passage of time, and

(4) the capability to protect a force or a designated group from a hostile and aggressive crowd or mob.

b. **Anti-materiel.** Non-lethal anti-materiel capabilities enhance the ability of a force to achieve its mission objectives by reducing or eliminating the enemy's ability

to use his equipment and supporting infrastructure. This capability is of great value when more destructive conventional military means would be excessive and counter-productive. Non-lethal technologies in this regard focus on two primary capabilities as follows:

(1) **Area denial.** The aim of area denial NLW is to prevent vehicles (wheeled and tracked) from using a designated area. Restrictive measures include vehicle entanglement or containment systems[2] that render vehicles inoperable within the systems zone of influence, and systems that reduce the trafficability of the terrain, such as anti-traction agents, and

(2) **Neutralization/Disablement.**

(a) This function seeks to disable or neutralize a wide range of materiel targets such as equipment, weapon systems, vehicles and infrastructure facilities. Examples include lasers targeted against optical sensors and targeting devices and LME, polymer and super adhesive agents which disable mechanical linkages and alter material properties causing general equipment and weapon failure. HPM can cause electronic failure in ignition systems, communications, radars, computers and navigation aids.

(b) NLW can be used to attack the enemy's critical command and communication

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[2] An example is the Portable Vehicle Immobilization System (PVIS), a pre-emplaced command activated capture system designed to stop a 7500 pound vehicle travelling at speeds up to 45 miles per hour without causing permanent injury to the occupants. The PVIS deploys in a manner similar to an aircraft arresting gear system using a high strength net-like fabric.

nodes and computer networks. Computer software can be devastated by the remote injection of computer viruses. Similarly, certain biological agents designed to degrade silicon or other computer components can effectively cripple computerized components on a wide scale.

(c) Some NLW can be used at the strategic level to degrade an enemy nation's infrastructure damaging his combat power and sustainability. Such NLW include conductive ribbons to short circuit power lines, the contamination of fuel reserves and the weakening or destruction of bridges and key installations.

OPERATIONAL EMPLOYMENT

7. NLW have the potential to be employed across the spectrum of conflict from operations other than war (OOTW) to general warfighting. In the case of domestic operations, current Canadian Forces (CF) policy dictates that the military will not develop a capability for which it does not have a mandate, such as civilian crowd and riot control. This policy recognizes the fact that civilian police possess the necessary training, expertise and equipment for crowd confrontations while the army is seen as the force of last resort. In domestic operations, intervention by the military in crowd and riot control situations should occur only when the situation has escalated to the point where a lethal option must be considered in order to restore control.

8. The CF has no mandate for civilian crowd and riot control tasks within Canada, other than to act in the interest of self-defence. Any decision to employ and suitably equip Canadian troops for this role outside of Canada (e.g. peace support operations) must be subjected to a thorough risk analysis. Such actions have all the risks associated with military confrontations with crowds and mobs during domestic operations at home, as well as the added complications of dealing with foreign cultures and attitudes.

9. NLW are simply another resource available to a commander for the accomplishment of his mission. NLW provide the commander with a more extensive array of options to augment deadly force, but not to replace it. The use of NLW must be carefully controlled by the on-site commander who is responsible for determining whether this option should be employed. The resort to deadly force must always remain available to the commander when the situation demands it and NLW must never jeopardize the right of the soldier to self-defence with lethal force.

NLW USE IN OOTW

10. The operational environment will continue to be typified by an increased level of interaction between friendly forces and friendly, neutral, or hostile civilian populations. The urbanization of many crisis-prone regions of the world creates the potential for large, vulnerable groups of non-combatants to be caught up in military confrontations.

11. Canadian troops increasingly operate in the often highly charged environment of OOTW. This milieu includes activities such as peace support operations, military support to civil authorities and service-assisted/service-protected evacuations. These operations often involve close and continual interaction between soldiers and non-combatants. Some OOTW scenarios include the presence of paramilitary forces or armed factions that present a real but ill-defined threat. In these situations, the mission of military forces commonly has aspects that are preventative in nature. This may include preventing individuals or groups from carrying out undesirable activities, separating combatants and non-combatants and providing for the protection of friendly forces and installations. In these cases, the use of deadly force, for purposes other than self-defence, may be constrained by rules of engagement or by the judgement of the on-site commander.

12. Traditional military weapons require commanders to make difficult trade-off decisions between mission accomplishment, force protection, and the safety of non-combatants. Commanders face a difficult dilemma when the rules of engagement are relaxed. While this may allow for a more efficient attainment of the mission and enhance force protection through increased freedom in the application of firepower, this measure potentially decreases the safety of non-combatants. Conversely, when the safety of non-combatants is made a high priority through restrictions on the use of

firepower, friendly troops may be put at risk and the mission objective may be more difficult to achieve.

13. NLW expand the number of options available to commanders confronting situations where the use of deadly force poses problems. They provide flexibility by allowing troops to apply measured military force with a reduced risk of serious non-combatant casualties, but in a manner that provides force protection and effects compliance with the intended operational objectives. Since NLW can be employed at a lower threshold of danger, commanders can respond to an evolving threat situation more rapidly, thereby retaining the initiative and reducing the vulnerability of the force.

NLW USE IN WARFIGHTING

14. In warfighting, NLW could be used to disrupt military logistics and communication systems, to neutralize power stations, command and control facilities and other essential elements of civilian and military infrastructure. Devices producing non-nuclear EMP can be used to disable vehicles or aircraft on the ground rendering them useless on a temporary or even permanent basis. Similar means may be used to attack an enemy's critical command and communication nodes by directly affecting the operation of electronic hardware. NLW may also be used as a means to destroy or disable an adversary's weapons of mass destruction facilities or delivery systems.

15. The deliberate introduction of computer viruses into an enemy's command, control and information system could have serious effects on software applications and paralyse his capacity to conduct and coordinate operations. Certain biological agents that are designed to attack silicon or other computer components could effectively destroy computerized warfighting equipment.

16. At the operational and tactical levels NLW can be used to degrade or destroy enemy vehicles, equipment, command and control systems and sensors to such an extent that he is unable to manoeuvre, communicate, provide fire support or sustain himself. Potential applications include the use of super caustics sprayed on roads to deteriorate tank tracks and truck tires. Anti-traction compounds could be used to render mountain roads impassable, and embrittlement compounds could be sprayed on virtually any mechanical device rendering them ineffective over a period of time.

Binding coatings, such as super adhesives, could be used to coat and jam moving parts on equipment and weapon systems. NLW can also be employed to enhance the effectiveness of lethal weapons in warfighting situations. For example, a position might be engaged with NLW designed to neutralize personnel prior to an attack with conventional weapons, or vehicles might be immobilized for subsequent destruction by a follow on lethal strike.

17. Because the primary reason for using NLW is to minimize fatalities, permanent injury and collateral damage to property and the environment, their use may be useful in gaining the support of the local population (ie. winning the 'hearts and minds' of the people).

A possible warfighting scenario for NLW is depicted in the following graphic:

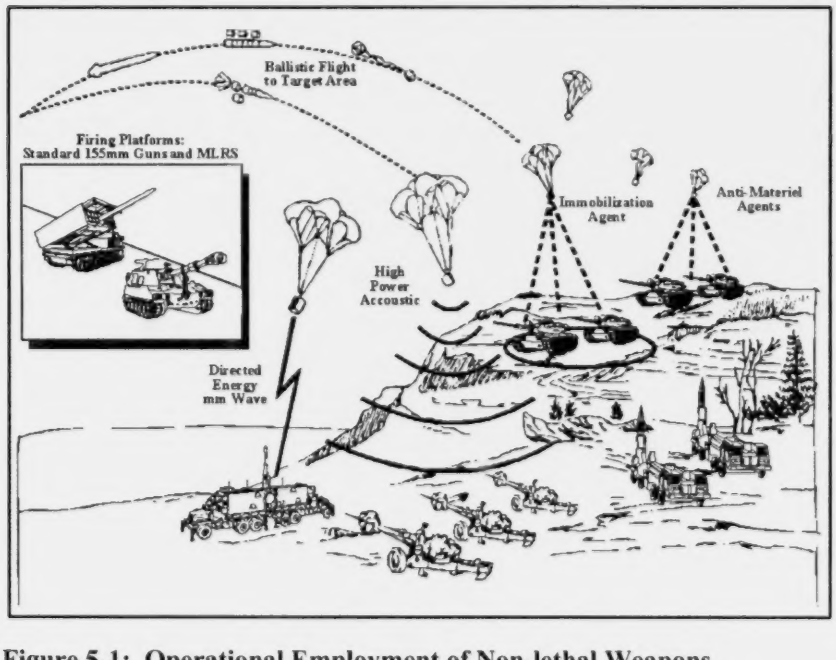

Figure 5-1: Operational Employment of Non-lethal Weapons

Historical Perspective:

The Gulf War provided an opportunity to demonstrate a generation of weapons systems, particularly the so-called "smart weapons" ... These systems included non-lethal options such as Tomahawk cruise missiles which deactivated Iraqi power stations by releasing thousands of spools of carbon fibres above power plants and switching stations. These drifted down onto the electrical components causing short circuits, thus cutting off supplies of electricity. The US has further refined this non-lethal concept with the development of a Wind Corrected Munitions Dispenser, which can be dropped on a target with great accuracy from altitudes up to 40,000 feet. Detonating near ground level, it bursts open releasing microscopic carbon fibres, which can penetrate into virtually anything including computers, vehicle electronics, telecommunications equipment and electric control panels, causing shorting and thus disruption of power, transport and communications. [3]

ADVANTAGES OF NLW

18. NLW provide flexibility by allowing military forces to apply measured amounts of force with reduced risk of serious non-combatant casualties, but in a manner that provides for force protection and mission achievement. Because NLW can be employed at a lower threshold of danger, commanders can respond to a developing threat more rapidly. This allows the military force to retain the initiative and reduce its vulnerability. The main advantages of using NLW may be summarized as follows:

a. They can be deployed to reinforce deterrence and military credibility by providing the commander with a graduated response over a wide range of military activities.

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[3] Nick Lewer and Steven Schofield, *Non-Lethal Weapons*, Zed Books, London, 1996, pp. 66-67.

b. They can reduce the risk of rapid escalation, especially in OOTW, by offering a progressive incremental increase in lethality. In specific situations, they may provide the opportunity for de-escalation.

c. They can provide a public and politically acceptable alternative means of conducting a wide variety of operations and tasks in that they enable force to be used with the likelihood of fewer casualties and less collateral and environmental damage than had conventional lethal weapons been used.

d. They can improve the capability of forces to conduct operations, particularly OOTW, where something more than diplomacy and less than lethal force is required.

e. They can be employed at the strategic, operational and tactical levels for relatively little cost in terms of expense, resources and commitment.

f. They can be used covertly to create uncertainty and fear and to lower morale among the target group or area.

g. They can reduce the cost of rebuilding the infrastructure and economy of a targeted area.

LIMITATIONS OF NON-LETHAL WEAPONS

19. The employment of NLW needs to be tempered with an appreciation of their limitations as follows:

a. Many non-lethal technologies raise ethical, legal and humanitarian questions regarding the criteria and guidelines for their use. The development of chemical and biological/bacteriological agents and compounds are particularly sensitive issues and their employment must be carefully assessed in accordance with the Chemical and Biological Weapons Conventions and the Law of Armed Conflict (LOAC). While some chemical agents, such as tear gas and pepper spray, are generally

acceptable for riot/crowd control by civilian law enforcement agencies, the use of riot control agents (RCAs), including tear gas and other gases that have debilitating but non-permanent effects, as a means of warfare is prohibited.[4] There is however, scope for the employment of RCAs by military forces as a means of self defence and force protection, within the context of law enforcement actions, in OOTW. However, even in OOTW the use of RCAs against other military forces is banned.

b. Chemical and biological/bacteriological weapons directed at human beings, which include toxic chemicals and their precursors (including those chemicals which can cause temporary incapacity) and munitions or devices designed to carry such chemicals, are banned. The use of chemical and biological/bacteriological applications designed solely to attack equipment and materiel (e.g. metal embrittlement, biodeterioration in explosives, etc) lacks clear legal precedent and requires close study and evaluation on a case by case basis.

c. International humanitarian law requires that weapons not cause unnecessary suffering and be discriminating in their employment. Some NLW have the potential to cause serious and permanent injury and the long-term after-effects of many NLW technologies on humans are unknown. A weapon that causes excessive injury or damage to civilians, their property, and the environment, without distinction, in the course of engaging military objectives, is considered indiscriminate and therefore in violation of this principle. As an example, aircraft could dispense a super-corrosive in spray form, designed to render vehicles inoperable, with potentially serious implications for individuals inadvertently caught underneath such an application. The dispersal by wind and rain of super-lubricants, designed to render runways

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[4] B-GG-005-027/AF-020, *The Law of Armed Conflict* (LOAC), p. 5-3.

and roads unusable, could lead to the contamination of water supplies and other serious environmental effects.

d. In accordance with the LOAC, laser weapons specifically designed, as their sole combat function or as one of their combat functions, to cause permanent blindness are prohibited. This ban also applies to the deliberate use of lasers, such as laser targeting systems, to deliberately blind an adversary. However, blinding as an incidental or collateral effect of the legitimate military employment of laser systems is not covered by the prohibition.[5]

e. With the prospect of few casualties and little collateral damage, the deployment of armed forces could become more acceptable and thus a more frequently employed means of government policy. NLW have the potential to lower the threshold of war and/or increase the incidence of intervention by one nation in the affairs of another. What one nation might see as a reasonable and restrained response to a situation (ie. a non-lethal response) might be interpreted by another as an act of war or possibly an invitation to escalation.

f. NLW must be used with great care as many agents and devices can inadvertently have the same effect on friendly forces as the intended target. Examples include incapacitating agents, anti-materiel compounds and acoustic devices where a misdirection of the non-lethal means could incapacitate friendly forces as well as the target area. There is therefore a danger of fratricide and/or non-combatant casualties unless strict command and control arrangements are adhered to and the Rules of Engagement (ROE) are obeyed.

g. The delivery systems for many NLW are vulnerable in that they have limited stand off ranges automatically

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[5] LOAC, p.5-3

causing friendly forces to come into close proximity to the target.

h. Many nations tend to view the use of NLW as proof of civility, restraint and a commitment to the use of minimum force. Some adversaries however, especially in situations where the social order has degenerated into anarchy, may view the use of NLW as a lack of strength and resolve to resort to lethal means on the part of the deployed force. This may lead to efforts to exploit the perceived weakness, possibly resulting in increased risk to friendly forces and non-combatants. The use of NLW should always be backed up with the ability to use lethal force as necessary. This limitation serves to emphasize the requirement for well-defined rules of engagement and a clear force continuum scale.

EMPLOYMENT PRINCIPLES

20. The following employment principles are intended to ensure common direction, focused effort and efficient use of NLW:

a. **Authorization.** Commanders will seek CDS authorization to employ specific NLW through the Rules of Engagement process as detailed in B-GG-005-004/AF-005, *Use Of Force In CF Operations*.

b. **Augment Deadly Force.** A force armed with only traditional military weapons has few options for effecting compliance—maintaining a presence, the threat of force, including firing warning shots, or actually employing deadly force. NLW provide commanders with a more extensive array of options providing the means for flexible and selective engagement. The wider range of options provided by non-lethal capabilities augments deadly force but does not replace it. The resort to deadly force must always remain available to a commander when the situation demands it and NLW should never jeopardize the right of soldiers to defend themselves with lethal force. Rules of engagement must be clearly

articulated and understood to establish the role of NLW as an additional means of employing force, for the specific purpose of limiting the probability of death or serious injury to non-combatants and in some cases, to enemy combatants. The ROE continuum must not necessitate the use of NLW as a precursor to lethal force.

c. **Legality.** The employment of NLW must be consistent with the following:

(1) treaties and conventions to which Canada is a signatory;

(2) international law; and

(3) national law, including the LOAC.

d. **Fratricide.** NLW must be employed in such a manner so as to minimize the potential for fratricide.

e. **Provide Variable Response Capability.** In order to realize their fullest potential NLW must be capable of delivering varying levels of effects and be integrated with lethal weapons. This characteristic is sometimes referred to as a "rheostatic" or "tuneable" quality. The objective is to enable commanders to increase or decrease the degree of non-lethal effects applied in order to ensure compliance. The rheostatic capability provides a range of effects necessary to achieve a continuum of force scale. It is not necessary for a single system to have this characteristic, but rather, that the family of NLW employed by the force possesses this capability. Notwithstanding the above, our troops should never be limited to carrying only NLW. Each soldier must have recourse to conventional lethal means whenever necessary.

f. **Planning**. Planning for the use of NLW should always consider the following:

(1) The operational response to possible reactions by the target should, if practical, be fully rehearsed. Planning must also consider the potential counter-measures that a target group might employ to negate the effects of NLW.

(2) Preparations should include a plan to deal with and seek the support of the media. Personnel participating in interviews or briefings must be prepared to address the role of NLW so as to provide a clear understanding of the role of these weapons.

(3) Medical, legal, civil and public affairs authorities should be prepared to respond, as applicable, in the event of unintended results and side-effects caused by the use of NLW.

g. **Equipment, Training and Organization.**

(1) NLW must not create undue burdens on a unit, but rather should enhance the commander's ability to accomplish assigned missions. In order to be of practical, NLW must provide commanders an adaptable and reliable capability to influence the tactical situation. As much as possible, NLW should be compatible, complementary and easily integrated with current and planned conventional weapons.

(2) NLW designed to be carried and employed by the individual soldier must require an absolute minimum of additional hardware and increase in equipment load. They should be designed for simplicity of operation and maintenance. As much as possible, non-lethal effects should be delivered by existing launchers and weapon systems. Larger stand alone non-lethal systems should be designed for ease of adaptation to existing vehicles and aircraft without extensive modifications to these platforms.

(3) NLW should generate only limited requirements for new military occupation specialities or new organizations dedicated to their operation or maintenance. The use and maintenance of these systems should not require commanders to make major alterations to the organization of their units or dedicate a significant percentage of the unit's assets to these purposes.

(4) NLW training must be readily integrated into other individual and unit training activities. NLW and tactics should be designed for ease of use after brief periods of individual and collective training. This training should not detract from the unit's other operational training tasks.

h. **Provide for Ease of Deployment.**

(1) NLW must be mobile and capable of being deployed in a timely manner without creating logistic difficulties. This requirement dictates that non-lethal systems impose a minimum burden on strategic lift resources and be capable of rapid movement within a theatre of operations. At the tactical level, NLW ammunition and support equipment should not over-extend a unit's organic transport resources.

(2) NLW systems must be robust to ensure continued operation under extreme field conditions and, as much as possible, should be capable of being maintained in the theatre of operations. NLW maintenance requirements should be compatible with those for other equipment items with few demands for large quantities of system specific test and repair equipment.

(3) Expendable NLW munitions should have a long shelf life and be compatible with conventional

munitions for the purposes of storage and transport.

SUMMARY

21. In the modern operational environment conventional firepower, or the threat of lethal force, may not be an appropriate solution to a situation previously were amenable by traditional military responses. With an increased level of public sensitivity concerning the use of military force, NLW offer the army a wide variety of employment options across the entire spectrum of conflict.

22. NLW must be fully integrated with more conventional weapon systems and, although they may be used alone or with other similar systems to provide a synergistic effect, they must always be backed up with lethal force.

23. Many of the newer NLW systems are technologically immature and there are still uncertainties as to the possible effects caused by their application. This makes it difficult to assess their effectiveness in a military situation. The introduction of many NLW presents numerous legal questions, which must be satisfactorily resolved before their use in operations. The process of developing and/or acquiring a NLW capability by Canada's Army bears with it the obligation of determining whether its employment would, in some or all circumstances, be prohibited by the LOAC.

ABBREVIATIONS AND ACRONYMS

AADC, Area Air Defence Commander	CDAAZ, commandant de la défense antiaérienne de zone
ACA, Airspace Control Authority	ACEA, authorité de contrôle de l'espace aérien
ACO, Airspace Control Order	OCEA, ordre de contrôle de l'espace aérien
ACP, Airspace Control Plan	PCEA, plan de contrôle de l'espace aérien
ACS, Airspace Control System	SCEA, système de contrôle de l'espace aérien
ADC, Air Defence Cell	CDAA, cellule de défense antiaérienne
ADW, Air Defence Warning	ADAA, alerte de défense antiaérienne
AGM. Attack Guidance Matrix	MDA, matrice directrice d'attaque
AH, Attack Helicopter	HA, hélicoptère d'attaque
AI, Air Interdiction	IA, interdiction aérienne
Airspace Control Area	ZCEA, zone de contrôle de l'espace aérien
AO, Area of Operations	ZO, zone d'opérations
ASCC, Air Space Coordination Centre	CCEA, centre de coordination de l'espace aérien
ATACMS, Army Tactical Missile System	ATACMS, système de missiles tactiques de l'Armée de terre
BADC, Brigade Air Defence Cell	CDAAB, cellule de défense antiaérienne de brigade
BAIO, Brigade Artillery Intelligence Officer	ORAB, officier du renseignement artillerie de la brigade
BC, Battery Commander	CB, commandant de batterie

BDA, battle damage assessment	BDA, évaluation des dégâts de combat
C2, Command and Control	C2, commandement et contrôle
CADC, Corps Air Defence Cell	CDAAC, cellule de défense antiaérienne du corps
CAS, Close Air Support	AAR, appui aérien rapproché
CCIS, Command and Control Information Systems	SICC, systèmes d'information de commandement et de contrôle
CF, Canadian Forces	FC, Forces canadiennes
CNA, Computer Network Attack	ARI, attaque des réseaux informatiques
COA, Course of Action	plan d'action
CSS, Combat Service Support	SC, soutien au combat
CWC, Chemical Weapons Convention	CAC, convention sur les armes chimiques
DADC, Division Air Defence Cell	CDAAD, cellule de défense antiaérienne divisionnaire
DAIO, Divisional Artillery Intelligence Officer	ORAD, officier du renseignement artillerie de la division
DOCC, Deep Operations Coordination Centre	CCOP, centre de coordination des opérations en profondeur
DP, Decision Point	PD, point de décision
DS, Direct Support	AD, appui direct
DST, Decision Support Template	GPD, gabarit de prise de décision
ECM, Electronic Countermeasures	CME, contre-mesures électroniques
EM, Electromagnetic Spectrum	SE, spectre électromagnétique
EMCON, Emission Control	CONEM, contrôle d'émission

EMP, Electromagnetic Pulse	IEM, impulsion électromagnétique
ESM, Electronic Support Measures	MSE, mesures de soutien électronique
EW, Electronic Warfare	GE, guerre électronique
FAC, Forward Air Controller	CAA, contrôleur aérien avancé
FDC, Fire Direction Centre	PDF, poste de direction des feux
FFA, Free Fire Area	ZFV, zone de feu à volonté
FLOT, Forward Line of Own Troops	LAFA, ligne avant des forces amies
FSCC, Fire Support Coordination Centre	CCFA, centre de coordination des feux d'appui
FSCL, Fire Support Coordination Line	LCFA, ligne de coordination des feux d'appui
FSCM, Fire Support Coordination Measures	MCFA, mesures de coordination des feux d'appui
FSSL, Fire Support Safety Line	LSFA, ligne de sécurité des feux d'appui
GS, General Support	AG, appui général
HIMAD, High to Medium Altitude Air Defence	DAAGMP, défense antiaérienne à grande et moyenne portée
HPM, High-Powered Microwaves	MGP, micro-ondes grande puissance
HPT, High Pay-off Target	OR, objectif rentable
HPTL, High Pay-off Target List	LOR, liste d'objectifs rentables
HVT, High Value Target	OGI, objectif de grande importance
ICAC, Intelligence Collection and Analysis Centre	CRAR, centre de recherche et d'analyse du renseignement
IFF, Identification Friend or Foe	IFF, identification ami/ennemi

IO, Information Operations	OI, opérations d'information
IPB, Intelligence Preparation of the Battlefield	ATG, analyse tactique graphique
IR, Information Requirement	BR, besoins en renseignement
ISTAR, Intelligence, Surveillance, Target Acquisition and Reconnaissance	ISTAR, renseignement, surveillance, acquisition d'objectif et reconnaissance
JFACC, Joint Force Air Component Commander	CEAFI, commandant de l'élément aérien de la force interarmées
JFADC, Joint Force Air Defence Cell	CDAAFI, cellule de défense antiaérienne de la force interarmées
JFC, Joint Force Commander	CFI, commandant de la force interarmées
JSTARS, Joint Surveillance and Target Attack Radar System	JSTARS, radar interarmées de surveillance et d'attaque
JTCB, Joint Targeting Coordination Board	CICC, comité interarmées de coordination du ciblage
JTF, Joint Task Force	FOI, force opérationnelle interarmées
LME, Liquid Metal Embrittlement	fragilisateur de métaux
LOAC, Law of Armed conflicts	DCA, droit des conflits armés
MAE, Munition Effect Assessment	EEM, évaluation de l'effet des munitions
MLRS, Multiple Launch Rocket System	LRM, lance-roquettes multiples
NAI, Named Area of Interest	ZIPR, zone d'intérêt particulier répertoriée
NFA, No Fire Area	Z de S, zone de sécurité
NGF, Naval Gun Fire	AFN, appui-feu naval

NLW, Non-lethal Weapon(s)	ANL, arme(s) non létale(s)
OOTW, Operations Other Than War	OAG, opérations autres que la guerre
PIR, Priority Information Requirement	BPR, besoins prioritaires en renseignement
RCA, Riot Control Agent	AAE, agent antiémeute
RFA, Restricted Fire Area	ZFR, zone de feux réglementée
RFL, Restrictive Fire Line	LFR, ligne de feux réglementée
ROE, Rules of Engagement	RE, règles d'engagement
SACC, Supporting Arms Coordination Centre	CCAA, centre de coordination des armes d'appui
SEAD, Suppression of Enemy Air Defences	SDAE, suppression de la défense aérienne ennemie
SHORAD, Short Range Air Defence	DAACP, défense antiaérienne à courte portée
STANAG, Standardization Agreement (NATO)	STANAG, accord de standardisation (OTAN)
TA, Target Acquisition	AO, acquisition d'objectif
TACP, Tactical Air Control Party	ECAT, élément de contrôle aérien tactique
TAI, Target Area of Interest	ZICO, zone d'intérêt comme objectif
TAR, Tactical Air Reconnaissance	RAT, reconnaissance aérienne tactique
TLE, Target Location Error	ME, marge d'erreur
TSS, Target Selection Standards	NSO, normes de sélection des objectifs
TTP, Tactics, Techniques and Procedures	TTP, tactique, techniques et procédures
UAV, Unmanned Aerial Vehicle	VAT, véhicule aérien télépiloté

VSHORAD, Very Short Range Air Defence	DAATCP, défense antiaérienne à très courte portée
WCO, Weapon Control Order	consigne de tir
WCS, Weapon Control Status	consigne de tir
WMD, Weapons of Mass Destruction	ADM, arme de destruction massive